

# apc

australian personal computer

complete guide to going

## Totally wireless

What you need for a secure, high performance network in the home or office, **page 87**



IT'S HERE

## PCI Express

Biggest chipset change in 5 years

Prepare for DDR-2, onboard wireless and surround sound on the PC. **Page 40**

## Hottest sub-\$2K PCs

Plus latest graphics cards, 5 and 8 megapixel cameras, Double Layer DVD writers, and more.



## Dothan notebooks

4 blistering new models  
Labs tested. **Page 60**



## PC-based robots

x86-driven bots get your beer or guard your house.  
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More inside **apc** this month

- ★ **New Windows Watch column** — our spies in Redmond bring you the latest on Longhorn.
- ★ **Linux cheat sheet** — ultimate short cuts and commands, plus Debian user guide and Apache setup.
- ★ **Microsoft Small Business Server tips** — hands-on advice for administration and support.
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Full CD contents on **page 10**

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0 8

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A black and white photograph of a woman in a business suit, captured in a moment of extreme frustration. She is mid-air, having just kicked a computer monitor on a desk. Her mouth is open in a scream, and her expression is one of anger. The office setting includes a desk with multiple monitors and a keyboard. The background is a simple office wall with a window.

**acer**

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ACE3131



## The digital video camera that takes high-res photos.

The Canon MVX10i lets you choose how you capture your memories. It shoots razor sharp movies thanks to a 10x optical zoom lens complete with Image Stabilizer. While DiGiC DV technology lets you shoot sensational 2.2 megapixel still photos.





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**HIGHLIGHTS TECRA M2 (PTM20A-00RTD):** Intel® Centrino™ Mobile Technology provides high end performance for demanding applications/integrated Wi-Fi lets users connect to the network or the internet from anywhere within range of a hub or public hot spot/up to 11 hours\* battery life with optional batteries lets road warriors work away all day/slim, light, stylish magnesium alloy chassis can handle the rough and tumble and still look good. \*(Battery life may vary depending on configuration, applications, power management settings and features utilised.) Intel, Intel Centrino, the Intel Centrino logo, Intel Inside, and the Intel Inside logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

It can make IT managers  
look very good indeed.



**OBSERVATION:** The focus of corporate management today is firmly on growing revenue. They want an on-going competitive edge. They want innovative ways to drive growth rather than simply slashing short-term costs. And they want the IT department to play its part.

**OBJECTIVE:** Help IT mobilise the organisation with a business notebook that's designed from the top down, so that ease of deployment, manageability and reliability are as much a part of the brief as features, performance and value.

**RESULT:** The new Tecra M2 with Intel® Centrino™ Mobile Technology. This lightweight notebook looks as good on the desktop as it does on the bottom line. It provides all the performance that power-hungry users could ask for, a high-end graphics pack, extra-long battery life and more. And it features a long life cycle with platform stability for standard operating environments, unique management tools and numerous other attributes that help to maximize the on-going return on the investment. In fact, the savings start from day one, because the Tecra M2 also establishes an aggressive new price point. As a result, it'll be as popular in the boardroom as the engine room. And so will the IT manager.

**ACTION:** For more information see your nearest Toshiba Authorised Reseller, visit [www.isd.toshiba.com.au](http://www.isd.toshiba.com.au) or you can call 13 30 70 for more information.

Toshiba recommends Microsoft® Windows® XP Professional for Mobile Computing



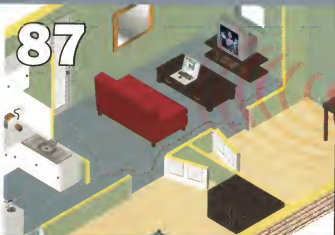
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This month's cover stories

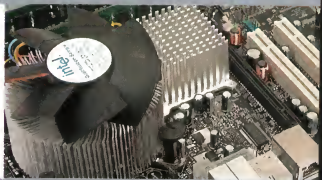
## Totally wireless

We're in the midst of the wireless revolution. James Bannan, Simon Johnson, Caroline Leming, Matthew Overington, Nick Race, Jarrod Spiga and Anton Tomazin round up the latest 802.11b/g hardware for home and office.



## PCI Express 40

Matthew Overington introduces the biggest change to the PC platform since the launch of the Pentium processor and considers the implications of these extensive upgrades and modifications.



## Hottest sub-\$2K PCs 58

Even without a monitor, the value in desktops below \$2,000 is stellar. David Lin rounds up four top machines.



## Dothan notebooks 60

Intel's Dothan CPU breathes new life into the Centrino platform. Matthew Overington tests four leading contenders.

## PC-based robots 112

They pack an x86 chip and a hard drive and can fetch you a beer or even protect your house. Simon Sharwood introduces the PCBot.



## Plus

New Microsoft Watch column 23

Mary Jo Foley believes Windows users are missing out on key features while Microsoft plays coy over a pre-Longhorn update.



# On Test



# WORKSHOP

## Reviews

PCI Express  
 Double Layer DVD burners  
 AMD Socket 939 Athlon 64 FX-53  
 InstallShield X  
 Dell AXIM X30  
 Windows Media Player 10  
 Panasonic e.View 17in LCD  
 ZoneAlarm 5  
 Epson PictureMate  
 and more...

## Labs Challenge

**5+ and 8 megapixel digital cameras**  
 As technology relentlessly advances, the capabilities of digital cameras continue to increase. *Valens Quinn* rounds up the latest 5+ and 8 megapixel releases.  
**19in CRT monitors**  
 While LCD monitors are the flavour of the month, there's life yet in CRTs. *Nick Race* examines seven top contenders.  
 and more...

Full index page **37**

## Need to Know

- ◀ Telstra may be trumpeting its goal of a million broadband signups, but other ISPs are pushing for faster speeds.  
 ■ Software locks used to prevent piracy could be putting a use-by date on your favourite applications.  
 ■ The Australian Democrats have a new "spyware control" bill in the works.  
 ■ Cheeky programmers get Mac OS X running on a PC.  
 ■ Video cameras and external hard drives will go wireless by Christmas, following the announcement of the wireless FireWire specification.

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Network security  
 Apache Web Server, part 2  
 Internet Explorer security  
 Windows Small Business Server  
 Graphics optimisation  
 Linux cheat sheet  
 and more...

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## TECHLIFE

**Books**  
 50 Fast Windows XP Techniques; IT Project Management; Programming Multiplayer Games; Dreamweaver MX 2004: A Beginner's Guide; Macromedia Flash MX 2004: A Beginner's Guide.



**Games**  
 Rise of Nations: Thrones and Patriots; True Crime: Streets of LA; Ninja Gaiden; Van Helsing.

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See page 147

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## Wi-Fi POWER KIT

To complement this month's wireless networking feature, we've included everything you need to manage, secure, connect, analyse, sniff and plot out a network with your wireless adaptor.

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## Full CD index

### CD 1

#### Full-working versions

- AllWebMenus LITE 3.0
- ◆ Full-working version
- AllWebMenus PRO 3.1
- ◆ Trial version
- ◆ Special offer
- Art-Copy 6.2
- ◆ Full-working version
- Art-Copy 7.1
- ◆ Shareware
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- Colligo Personal Edition 3.3
- ◆ Full-working version
- Colligo Workgroup Edition 3.3
- ◆ Trial version
- ◆ Special offer

#### Feature

- CommView for WiFi 4.2
- ◆ Exclusive extended trial
- ◆ Special offer
- ◆ Qurb 2.1 — trial version

#### ◆ Special offer

#### Wi-Fi Power Kit

- ◆ Boingo 1.3
- ◆ Colligo Workgroup Edition 3.3
- ◆ CommView for WiFi 4.2 — exclusive extended trial
- ◆ EggKey Gateway 1.0.66
- ◆ Ekahau Site Survey 2.0
- ◆ JiWire Portable Hotspot Locator 1.0
- ◆ NetStumbler 0.4.0
- ◆ PCTEL Segue Roaming Client 2.9
- ◆ Winc 2.0
- ◆ WPA Assistant 1.0
- ◆ WSC Guard 3.0

#### On Test

#### Reviews

- ◆ Borland Delphi 8 Architect Edition
- ◆ Microsoft .NET Framework 1.1
- ◆ Microsoft .NET Framework SDK 1.1
- ◆ Microsoft Visual J#.NET 1.1
- ◆ ZoneAlarm Security Suite 5.0
- ◆ Socket 775 walkthrough video

#### Browsers

- ◆ Microsoft Internet Explorer 6.0 SP1
- ◆ Mozilla 1.6
- ◆ Safari 1.0

### CD 2

#### Full-working versions

- Icon Catcher 3.1
- ◆ Full-working version
- ◆ Icon Catcher 4.0.12
- ◆ Trial version
- ◆ Special offer
- Site Publisher 1.4 —
- ◆ Full-working version
- ◆ Site Publisher 2.4
- ◆ Trial version
- ◆ Special offer

#### CD competition

Nero 6 including Nero PowerPack content

#### Workshop

#### Apache Web Server

- ◆ ActiveState ActivePerl 5.6.1.638
- ◆ ActiveState ActivePerl 5.8.3.809
- ◆ mod\_perl 1.0
- ◆ mod\_perl 2.0
- ◆ PHP 4.3.7 (Source)
- ◆ PHP 4.3.7 (W32 Installer)
- ◆ Apache Web Server 1.3.29 (Source)
- ◆ Apache Web Server 1.3.29 (W32 Installer)
- ◆ Apache Web Server 2.0.49 (Source)
- ◆ Apache Web Server 2.0.49 (Source)
- ◆ Apache Web Server 2.0.49 (W32 Installer)
- Graphics optimisation
- ◆ 3DMark2003
- ◆ PowerStrip 3.49
- ◆ Rage3D Tweak 3.9
- ◆ RivaTuner 2.0
- Linux commands
- ◆ Linux cheat sheet
- MRG
- ◆ ActivePerl 5.8.3.809
- ◆ Getf 2.3.1

## AllWebMenus LITE 3.0

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- Multi Router Traffic Grapher 2.10.13
- NET-SNMP 5.1.1
- Replacement Find8in.pm file for ActivePerl
- SNMP-Informant 1.3
- SNMPSniff 0.9b
- Wireless network security**
- WinRADIUS 2.11
- NetStumbler 0.4.0

## Labs Challenge

### 19in CRT monitors

- Nokia Monitor Test 1.0.0.1

## Databases

- askSam 5.1
- MySQL 4.0.20a for Windows

## Toolkit

- Linux**
- Adobe Acrobat Reader 5.0.9
- ATI Proprietary Linux Driver 3.7.6
- cdrtools 2.00.3
- Firestarter 0.9.3
- Gaim 0.78

- gFTP 2.0.17
- GIMP 2.0.2
- Linux Kernel 2.6.6
- nVidia Accelerated Linux Driver Set 1.0-5336 for Linux IA32
- RAR for Linux 3.30
- WebMin 1.150
- XMM5 1.2.10

## Mac OS

- Adobe Reader 6.0.1
- Authoxy 3.1.1
- Carbon Copy Cloner 2.3
- Chicken of the VNC 1.3.6
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- Graphic Converter 5.1.1
- iGetter X 1.9.5
- Launchbar 3.3
- Microsoft Remote Desktop Connection 1.0.2
- PDF Browser Plugin 2.0.1
- RBrowser 3.2.2
- VLC Media Player 0.7.2

## Windows

- Ad-aware Standard 6 Build 181
- Adobe Reader 6.0.1
- ATI Catalyst Software Suite 4.3 for Windows 98/Me
- ATI Catalyst Software Suite 4.6 for Windows 2000/XP
- Core FTP Lite 1.3a
- DirectX 9.0b
- DivX Video Bundle 5.1.1
- Gsplit 1.8
- ICQ Pro 2003b build 3916
- Pegasus Mail 4.12a
- PowerPoint 2003 Viewer
- Spybot - Search & Destroy 1.3
- Winamp 5.0.3 Free
- Windows Installer 2.0 for Windows 95, 98 and Me
- Windows Installer 2.0 for Windows NT 4.0 and 2000
- Windows Media Player 9
- WinRAR 3.30
- Xnews 5.04.25
- ZoneAlarm 5.0.590

## Site Publisher 1.4

This handy utility can upload a Web site from your PC, and keep both copies synchronised. It uploads new and updated files, deletes files and directories that are no longer needed, and can resume all broken transfers, regardless of the type of Web connection.



For Windows 95, 98, Me, NT4, 2000 and XP.

As sold for  
**US\$24.95**

## Qurb 2.1

Effectively block spam in Microsoft Outlook and Outlook Express, with this feature-rich antispam tool. APC readers can purchase the latest version for 15% off the normal retail price, but only for a limited time.



## Icon Catcher 3.1

Icon Catcher scans your hard drives for icons, displays them, and lets you use them elsewhere. APC readers can also purchase the latest version with a 50% discount off the normal retail price.

For Windows 95, 98, Me, NT4, 2000 and XP.



As sold for  
**US\$10**



## Graphics optimisation Workshop

On page 138, Asher Moses explains how to get the most out of your graphics subsystem using these handy utilities. We've included 3DMark03, PowerStrip, Rage3D Tweak and RivaTuner, so you can juice your video card for all it's worth.



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Three months into the job at APC and I've already had to deal with the cries of anguish from some technology product managers whose products have received bad reviews.

Typically, I'll get an email or even a phone call from an aggrieved vendor, who'll claim we've defamed their hardware or software or have got the review totally wrong and don't know what we're talking about.

On rare occasions, the advertising card is played. The vendor threatens to "review" their advertising spend with the magazine unless we adopt a gentler disposition towards their merchandise. I've even had a request from a computer company that I front up to its headquarters to explain why its hardware received a panning in an APC review.

When I talk to vendors, I always try and make a very simple point, one that some of the more experienced product managers understand and accept: that it's in their long-term interests that APC is honest in its appraisal of product. This is because when we do praise a PC, peripheral or program, that opinion will be credible with our readers, who aren't exactly novices when it comes to assessing computer gear.

The value of this to a vendor can't be overestimated. Our praise is hard won, but because it's independent and resonates with a sophisticated technology readership, it can also sell a lot of product. I've already seen some pretty creative sales campaigns whipped up after APC has praised computer products — particularly after we've given them our Editor's Choice award — and a lot of gear was sold as a result.

However, one campaign that may have been a bit too creative for my liking was conducted by a computer vendor, PC Xpress. The vendor's Advance 1000 PC was named Editor's Choice in our PC Megatest (APC June, page 78) because it represented excellent value at \$991. But several days later, we started getting emails and calls from irate readers who were told by PC Xpress that the Advance 1000 had sold out and they should consider a more expensive machine, the Advance 1100.

The company's IT manager told APC that the system had sold out within "about a week and a half", and added that he couldn't build any more because certain components had been unexpectedly discontinued and the price

of RAM had increased (see "Watchdog" on page 34 for more detail).

When we checked the PC Xpress Web site, it featured the more expensive PC together with an APC Editor's Choice logo. We hadn't reviewed the Advance 1100, let alone given it an Editor's Choice award, so we demanded that the logo be removed at once. PC Xpress eventually complied, but it left a bad taste. The episode has also ensured we'll be more thorough in assessing a company's ability to deliver products that we review.

Following the introduction of our Broadband Directory (page 149) in June, some readers have been puzzled by the absence of a listing for BigPond. Telstra is missing because the APC Broadband Directory is not a directory of the biggest broadband ISPs. Rather, it is a listing of ISPs that meet the criteria we believe deliver the best value to our readers.

One of these criteria is that ISPs not meter upstream traffic. If you're a typical APC reader who transfers big files for professional or personal reasons, you'll hit the Telstra plan's limit much quicker than in a plan which

doesn't meter uploads.

This might not be an issue for people who don't upload much data, and if so, the Telstra unlimited plans (where you get throttled back

only after 10GBs of data transfer) appear to be good value. But our directory is about meeting the needs of APC's readers who, on the whole, tend to be serious data shifters.

For those conspiracy theorists who emailed me wondering whether we have a particular issue with Telstra, we don't. But when you're Telstra and you control so much of the ISP infrastructure in this country, you're always going to be in the firing line. Indeed, on page 15, Dan Warne discusses claims that Telstra Wholesale is holding up development of the DSL2+ broadband standard, in which speeds of 24Mbit/s can be achieved.

Having dealt with Telstra Wholesale in the past while working for an ISP, I think what we're seeing is merely a big telco moving at a big telco's pace. I could never fault the professionalism in Wholesale and its enthusiasm in looking after its ISP customers. They just have to please a lot of people, and put up with Telstra's other divisions.

Which is just like the job we have: ensuring that we're not seen as the bad guys because we don't give every product a glowing review.

## Our praise is independent and resonates with a tech-savvy readership



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# Need to Know

News, views and analysis from the IT world

## ADSL grows up

Telstra may be trumpeting its goal of one million broadband signups, but other ISPs are jumping ahead with a push for faster speeds, reports **Dan Warne**.

At least four prominent ISPs in Australia are now offering significantly faster ADSL services than those available through Telstra's DSL network.

Canberra-based TransACT, currently in the process of expanding into NSW, is offering 5Mbit/s, while iiNet has already offered 2Mbit/s in a pilot scheme and will enable 35 telephone exchanges by Christmas.

In Queensland, OnTheNet is offering 2Mbit/s and South Australia's Agile Communications said it has the capacity to offer faster speeds than Telstra in areas it has exchange coverage, though it hasn't yet decided what speeds residential customers will actually get.

Telstra artificially limits the maximum speed on its DSL network to 1.5Mbit/s. It's an ongoing bone of contention for ISPs and customers alike, because the ADSL standard is capable of download rates up

to 8Mbit/s. TransACT said it has had no problems winding line speed up to 5Mbit/s for customers who live within 3.5km of an exchange using its own hardware.

While Telstra has pointed to 100Mbit/s optic fibre as a sign of speeds to come (see page 22), more than 50% of Australian broadband users are on copper line ADSL. With optic Internet years away for

most people and wireless Internet in its infancy, the future of next-gen broadband for the majority depends on how far the ageing

copper network can be upgraded.

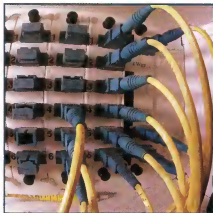
While all four companies say they're pleased that they're finally able to offer faster speeds than Telstra, they remain frustrated. That's because their hardware is capable of up to 24Mbit/s speed using the DSL2+ standard, but industry approval for the standard, largely under Telstra's control, is likely to drag on well into next year.

For instance, by using new access hubs installed in some ACT and NSW exchanges, TransACT could deliver MPEG-4 pay TV, Voice over IP (VoIP) telephony and broadband Internet via DSL2+.

Telstra said its own testing is necessary to ensure DSL2+ doesn't interfere with spectrum used for other services on Australian phone lines. The new broadband standard uses twice the spectrum on the phone line that the original ADSL-1 standard used, but it's outside the spectrum used for voice telephony.

End user DSL hardware makers, including Netgear and D-Link, claim their latest modems are already DSL2+ capable:

### DSL2+ could be a political minefield for Telstra



**Plug in:** Net users will soon be tapping into faster ADSL connections.

## Broadband

a simple firmware upgrade will turn the capability on. But they too are waiting until ISPs get approval to run at the faster speed.

Telstra Wholesale's Liz Jurman denied the telco giant was delaying the approval process, saying it was actively pursuing the deployment of DSL2+ within its own network. She said one problem the telco was facing was a shortage in DSL2+ hardware from network suppliers.

She argued that Telstra had been historically quick to adopt standards

## Also in Need to Know:

### 22 Feature Election special

Fibre optic broadband bolsters the Government's claims that Australia is an IT world leader, but many people are still stuck on dialup. *Dan Warne* investigates.

### 24 Feature Virus fighting CPUs

A new feature built into Windows XP SP2 uses your CPU to jam bad code. *David Braue* reports.

### 26 Dispatch Techies on tenterhooks

In the wake of its report on offshoring, APC asks the question: who, exactly, does the Australian Computer Society represent?

### 28 Opinion

*William Maher* thinks Microsoft's Media Center is just one of a long line of weird PC designs.

*Mary Jo Foley* believes Microsoft is playing coy over a pre-Longhorn update.

### 30 Epinions

APC readers have their say.

### 34 Watchdog

The Advance 2000 won an APC Editor's Choice award, but many readers discovered it was unavailable.

## Democrats eye spyware

Fresh from a campaign championing open source, the Australian Democrats have a new "spyware control" bill in the works.

Rather than banning spyware, the bill aims to ensure that PC owners are told exactly what's being installed and are given an option to say no. Spyware makers must also include an "undelete" option under the proposal.

"We're not banning anything, we're not even banning Trojans," said Democrats IT advisor Keith McKenzie. "If people want Coolsearch and Gator, then they can have it. It's just that they should be informed about what's being installed."

Among the list of targets is Kazaa, Gator, Red Sheriff, Coolsearch and DoubleClick.

Expect a long fight. Last time we checked, Gator was making US\$35 million a year from advertising, despite one US state having already declared spyware illegal.

## Software lockdown heats up

Periodic check-ins have become a reality for MYOB users.

Software locks used to prevent piracy could put a "use-by date" on your favourite applications according to critics of a new approach to piracy prevention.

MYOB is forcing purchasers of some of its 2004 products to periodically reactivate their applications for the life of the product. This means that every four to nine months, users must contact MYOB by phone or via the Internet. If they don't, their MYOB files will revert to read-only status.

The MYOB system is different to the type of lockdown used by Microsoft, Macromedia and others, which requires reactivation only if a certain number of hardware components are changed.

MYOB claims its approach allows people to use their software on more than one PC. "We've taken the customer-friendly approach of not locking our activation process to the user's hardware," said MYOB Australia general manager Andrew Fiori-Dea.

"Certainly, you do have to let us know that it's still you [using the software] on occasion, but the flipside is that you can move your data from the home computer to the office computer, insert a new video card or update your hard drive and you won't need to reactivate."



**Locked out:** do software vendors have too much control?

But Dale Clapperton, board member for online civil liberties organisation Electronic Frontiers Australia, is concerned about the hidden implications of the software company's new spin on piracy prevention. "Requiring a one-off software activation when the product is installed is one thing, but requiring multiple activations is something else entirely — essentially you are leasing and not owning the software," he said.

Clapperton argued that software activation is just one of a series of recent developments in the

once they were ratified, pointing out that when the original DSL standard was finalised in 2001, Telstra began selling those services to the public a week later.

Nevertheless, ISPs are beginning to voice frustration over the wait for faster speeds. TransACT's chief technical officer, Steve Peddle, told APC that faster ADSL would threaten Telstra.

"I think Telstra is aware that fixed line telephone calling costs are going to decrease very, very rapidly over the next five years with the advent of Voice over IP, and Telstra is a company that makes most of its money from long distance telephony," he said.

"Competitors are looking at offering value-added broadband services over telephone lines over and above the telephone — that must worry Telstra a lot."

Peddle argued that the introduction of DSL2+ speeds could be a political minefield for Telstra, which is already dealing with complaints from people caught in broadband black spots. He added that many ISPs would be looking at using the higher speed and

additional services made possible by DSL2+ to compete more vigorously against Telstra.

Some ISPs are even considering pooling resources by sharing their DSL-enabled exchanges in order to create a larger network capable of competing with Telstra. Few, however, are prepared to publicly commit to such a move, citing concerns over how to get competing companies to fairly share such a network.

The public will get a better idea of whether Telstra is indeed dragging its feet on DSL2+ at the end of this year. James Duck of the Australian Communication Industry Forum (ACIF) told APC that a DSL2+ Australian standard document is expected to be completed by December.

"But ACIF is reliant on the resources contributed by the telecommunications companies," Duck added.

Telstra's Liz Jurman said that while all telecommunications companies were meant to contribute staff time to ACIF planning, as the largest telco, Telstra actually did most of the technical work for the ACIF.

## The new ADSL

**Higher speed broadband:** if you live within 3km of an exchange, you could get 14Mbit/s. Up to 4.5km away, you'll get 7Mbit/s. More than 4.5km away and you'll only get standard ADSL speeds — anything up to 1.5Mbit/s.

**Pay TV encoded as MPEG-4 video:** TransACT will offer Foxtel encoded as MPEG-4 streams. An IP set-top box such as the i3Micro Mood ([www.i3micro.com/i3web/moodbox.php](http://www.i3micro.com/i3web/moodbox.php)) handles playback to your TV. Each channel uses about 4.3Mbit/s of bandwidth, or 8Mbit/s for high definition.

**Voice over IP telephony:** your voice is sliced up into data packets and sent over the Net, eventually connecting back into real telephony networks. True DSL-based VoIP has high quality sound, and you get a phone number that other people can call you on.



## Software

production and sale of software designed to take control away from the end user. "We are getting to the point where software vendors will continue to have so much control over their product that they decide where and when you can use it," he said. "Software activation makes it easy for them to put a use-by date on their products."

### CONSUMER BACKLASH

The move has failed to impress some MYOB customers, who not only see it as annoying but also potentially detrimental to their business, given the lack of a limit as to how long they must keep checking in.

"I'm not willing to put the 2004 update on my machine: If something happens to MYOB down the track, my software is useless," said an MYOB beta tester who spoke to APC about the issue, but asked that his name not be published. "I can understand that [MYOB] needs to protect its software, but it's disgusting that you're forced to activate the product a couple of times a year."

Perhaps pre-empting a consumer backlash, lobby group the Business Software Alliance has released a code of best practice for product activation techniques. Priorities include making sure people stay anonymous, full disclosure about what details are transferred, security for the data

being transferred, ease of use and fast response times. However, it doesn't mention multiple reactivation processes, or that activation must stop after a certain number of years.

### PIRACY PROTECTION GONE MAD?

In the past 12 months Symantec, Macromedia, Reckon, MYOB and Adobe have all jumped aboard the software activation bandwagon. For the most part, they claim customers are happy. Yet the system isn't without problems.

Early this year Symantec was forced to fix a bug that meant that its antivirus software required reactivation after every reboot. And last year people trying to activate copies of Office XP and Windows XP discovered that the server meant to supply the crucial activation codes had gone down for several hours.

Meanwhile, vendors are hard-pressed to provide a clear indication that software lockdowns have actually cut down on piracy. Macromedia is already trying another way of tackling the problem head on by going after pirates online. This time, the software provider has installed "sniffers" which track advertisements for illegal copies of its apps on auction sites, then send notices requesting that illegal ads be removed.

Jeanne-Vida Douglas

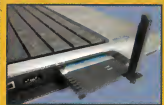
## Is it legal

### ... to hog Wi-Fi?

The prospect of siphoning off extra bandwidth on pay-per-use wireless networks has emerged, reports *New Scientist* magazine. Recent Wi-Fi cards make it possible to increase your share of bandwidth by altering the MAC protocol in Linux, with legal opinion divided on the consequences.

"Changing the [MAC] code may not be unlawful if access codes don't prohibit it," said Electronic Frontiers Australia's Kimberley Heitman. "An ISP would have a hard time getting a prosecution."

Logging on to a wireless LAN without permission, on the other hand, is definitely illegal.



Disclaimer: this does not constitute legal advice. Check with the appropriate legal authorities if any issue specifically concerns you.

## The hidden truth about DVD

### Is your drive already capable of burning 8.5GB discs?

Armed only with a small download, hackers are uncovering everything from gigabytes of DVD space to extra drive speeds and hidden menus. The free features are unlocked by flashing the hardware with a firmware update file.

Upgrading to a new 8.5GB Double Layer DVD burner, for instance, might not be necessary with the discovery that some single layer drives can already burn the new discs after a firmware update.

Users at the CDRInfo forum ([www.cdrinfo.com](http://www.cdrinfo.com)) discovered that the firmware for NEC's new Double Layer 2510A DVD burner could be flashed into a 2100A

or 2500A DVD burner. They uncovered a document in which NEC declared the that Double Layer drive is "electrically identical [to the single layer drive]... except for the model [number], firmware and FCC ID."

NEC's single layer 8x burner sells for \$159, several hundred dollars less than the Double Layer versions currently hitting the shelves. The NEC DVD burners are also supplied in some Dell and HP systems. To find out if you have one, download the DVDInfoPro tool from [www.dvdinfo.com](http://www.dvdinfo.com).

"We haven't been told by NEC that users can do it," said

Andrew Scalise of Cam1, the drive's Australian distributor. "But if NEC gave it the official green light, we wouldn't have a problem with it."

NEC Australia's spokesperson was unavailable for comment.

Another site, [cdfreaks.com](http://cdfreaks.com) (<http://cdfreaks.com>), reports that the Lite-On SOHW-812S has been successfully flashed with firmware for Sony's Double Layer DRU-700A VY02 drive, and that BenQ will be releasing an official update for its DW822 drive.

Unofficial firmware updates are also being used to unlock features in Canon's EOS 300D digital SLR camera, including menus and options found in a more expensive model.

## Storage



**Hack club:** enthusiast sites like [www.cdrinfo.com](http://www.cdrinfo.com) are testing the boundaries of DVD.

It's not the first time the hidden capabilities of cheap models have raised eyebrows. Intel's budget Celeron chip was shown to perform at significantly higher speeds than advertised, and it may not be long before there are more questions for hardware makers.

Dan Warne and APC staff

## MS on security: don't blame us

"There are days when we are really bored," quipped George Stathakopoulos, Microsoft's security chief, perhaps to the surprise of many who'd think Microsoft's global head of product security would be the most stressed person at Microsoft HQ.

Faced with continued criticism over security holes and a very public edict from Bill Gates to clean up Windows, the pressure is on like never before. But if the going's getting tough, Stathakopoulos isn't letting on.

"The problem with Seattle is that it rains all the time — there's not a lot of things to do," he told APC, though he admits it's often not long before something "really bad" happens.

For Microsoft, the most recent "something really bad" is this year's Sasser worm, which spread via security holes in versions of Windows XP and Windows 2000.

Despite new versions of Sasser and other worms appearing, Microsoft still claim to be winning the battle against viruses. In fact, there's been a subtle but significant change in the company's mantra lately, with Microsoft now deflecting blame.

"Most of the worms or viruses are not using vulnerabilities anymore," said Stathakopoulos. "Why? It's too hard. It's so much easier to create an email, write 'please click me' or 'you haven't returned my phone call' in the subject line, have somebody click an attachment and [then] bad things happen."

Not everyone agrees. Russ Cooper of security company TruSecure, who's also editor of NTBugTraq.com, reckons Microsoft's security efforts are actually going backwards.

Either way, Microsoft is gallantly refusing to take its eye off these non-Windows-based virus threats, introducing what some have dubbed a "shield" defence against generic threats in Windows XP Service Pack 2.

William Maher

## Kazaa rebuked by full bench

Delay tactics fail to stall Australian courts as Kazaa inches closer to trial.



Lawyers for Kazaa accused an Australian Federal Court judge of authorising an unlawful act in granting Anton Pillar orders to raid the Cremorne premises in February.

In early June, counsel representing Kazaa owner Sharman Networks told a full bench of federal court judges that Judge Wilcox had broken the Telecommunications Interception Act, which would invalidate the evidence captured during the raid, and carry an indictable offence against the judge.

Sharman made a scheduled application for leave to appeal the current case, when the extraordinary allegation was raised before a full bench (three judges).

"Your Honour's, we say his Honour's order of 6 February potentially authorised the interception of communications contrary to section 7 of the [Telecommunications Interception] Act and that consequently those orders were invalid," said the QC representing Sharman, Robert Ellicott.

"If this order has the effect that we submit



his Honour is giving it then it is authorising an unlawful act and one that is serious because it is an indictable offence," said Ellicott.

The allegation was not originally submitted to the court for consideration in this application for leave to appeal. The full bench also took a dim view that such a serious claim had never been raised before Judge Wilcox.

"Was this argued before his Honour?" asked Judge Emmett.

"It was not raised before his Honour," said Ellicott.

"Isn't that something that ought to be raised with his Honour," asked Judge Emmett.

"Yes, your Honour," answered Ellicott.

Ellicott said he was dealing with matters as they arose, but Judge Emmett suggested he raise it appropriately with Judge Wilcox.

## Data Dump

The value of PC gear allegedly stolen in daring daylight robberies on Google, Sun Microsystems and Oracle by a suspect dubbed the Silicon Valley Bandit.

The four-year spree netted CPUs, memory boards and switches before suspicious memory chips were spotted on eBay.

# US\$3 million

Recent investment fine given to Bill Gates

US\$800,000

(Source Windows and .NET Magazine)

Microsoft's earnings in the nine months ending 31 March

US\$5.48 billion

Email addresses on CD sold to spammers

37 million

(Source Globeandmail.com)

Price of CD

US\$129

Spam emails sent by convicted spammer Howard Carmack

825 million

Carmack's jail sentence

Up to 7 years

Emails on Telstra's network each day

20 million

(Source CDN, Telstra)

Infected files turned away each day by Telstra

600,000

"It goes without saying that we object very strongly to this matter being raised," said Judge Emmett.

Ellicott likened the evidence gathered under the court order to "communications passing between... Kazaa users."

Ellicott said that these communications are a fleeting moment and self-destructive by nature because they don't remain in existence.

He argued that the Anton Pillar order must relate to actual documentation and not information in transit.

The full bench reserved judgment on whether Kazaa is entitled to have an appeal against the Anton Pillar order and the evidence gathered.

An Anton Pillar order is granted by the court after substantial evidence is presented to indicate that crucial evidence could be destroyed by the parties in

question if advance warning is given.

A week after the full bench hearing in to Sharman's application seeking leave to appeal, Sharman lawyers raised the allegation to Judge Wilcox that he had authorised an unlawful act.

"If we are right about the telecommunications... it may have implications for the admissibility

of evidence," Ellicott said.

Judge Wilcox issued a strong warning that the appropriate court processes must be observed.

"If it is a serious point and you wish to seriously advance it then it ought to be in a structured way that I know what the issue is going to be. I will deal with it, but I will deal with it in a proper way. The way to deal with it is to file a motion for a variation of the order, put in a written outline of submissions

then it can be considered in context and ruling given on it if it's a serious point and worthy of being advanced in a serious way," said Judge Wilcox.

Judge Wilcox has said previously that this trial would formally proceed by the end of the year.

Meanwhile, key defendants in the Sharman and Brilliant Digital Entertainment (BDE) camps are no longer represented in court by unified counsel. BDE CEO Kevin Burmeister, BDE CTO Anthony Rose, Sharman CEO Nicola Hemming, and Sharman CTO Philip Morle have all recently sought separate legal representation.

In other developments, the US Senate is currently considering a proposal that would reshape the Copyright Act by outlawing peer-to-peer networks used for unlawful purposes.

The Induce Act proposes to make "whoever intentionally induces any violation" of copyright law, legally liable.

Garth Montgomery

## "It goes without saying that we object very strongly to this matter being raised"



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**stress free.**

With Dymo LabelWriter there are no more jams, no more scrunched up sheets, no more waste. It plugs into your PC or Mac and sits on your desk printing up to 32 perfect labels a minute. It has its own software and links with other popular software too. Choose from up to 40 label types (address, shipping, CD/DVD, file folders, you name it), print one label or hundreds. Check it out on our website - [www.dymo.com.au](http://www.dymo.com.au)

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LabelWriter  
DYMO saves you TYPING

## Apple's cult gets a shock

Cheeky programmers get Mac OS X running on a PC, reigniting personal computing's oldest war.

### Quote File

**"Buy the stock — whatever the price!"**

Bill Gates is all smiles about Google's upcoming public float, but behind closed doors a battle royal is brewing between the software giant and the search engine. Google has a rumoured desktop file search tool that could steal Longhorn's thunder, while Microsoft is working on its own search algorithm plus blog search. (Source: *BusinessWeek*)

The unthinkable has happened: PC users have got Mac OS X running on commodity Intel hardware.

For Mac owners long accustomed to Apple's almost cult-like status among fans, the news brings an end to decades of technical incompatibilities separating them from the x86-based PC world.

The open source emulator PearPC is capable of booting the latest release of OS X Panther (10.3.4) in Windows and Linux. After just a few weeks of development, new test versions are quick enough to play back medium-quality QuickTime movies and show onscreen animation at realistic speeds. Fans point out that you don't have to use a pirate copy of OS X — the boxed version purchased from an Apple store will install just fine.

For now, its unlikely potential Mac users will be rushing instead to hybrid Mac-PCs — the emulation runs extremely slowly on Windows XP. Still, the software is a miracle of emulation: its makers have successfully shoehorned PowerPC Reduced Instruction Set Computing (RISC) into the significantly less efficient environment of Complete Instruction Set Computing (CISC) on which Intel and AMD chips are based. Some said it couldn't be done.

Mac owners who've shelled out thousands for the Mercedes of home PCs aren't convinced. Some



**Panther power:** is emulation the sincerest form of flattery?

are rallying against "Mac wannabes" while others refuse to believe PC users have gained anything.

"OS X means nothing if you run it on a crap PC. All you get is a cool OS on a crap PC which means it will crash as much as if it was running Windows!" retorted Pedro Vera on his Macintosh Weblog.

Apple Australia isn't amused either. Public Relations manager Martha Raupp told APC: "The Mac offers a complete experience because Apple makes the software, hardware and operating system. Taking one piece out and trying to manipulate it to turn it into something else is nonsense."

Raupp has a point: at this stage PearPC only has network support for two specific Ethernet chips, and the latest "official" version doesn't even recognise right mouse clicks.

As far Apple's CEO Steve Jobs is concerned, Mac OS X is still the leader in operating system design. Jobs has been focusing on drawing attention away from Microsoft's next-gen Windows, codenamed Longhorn, recently telling a conference that it's "basically a copy of Mac OS X a year ago."

Jobs also claimed that Microsoft was chasing Apple's tail again — "and that's kind of fun". PC owners might beg to differ.

Dan Warne

### Inside info

PearPC official site  
<http://pearpc.sourceforge.net>

PearPC community site  
[www.pearpc.net](http://www.pearpc.net)

Configure PearPC the easy way  
<http://Pargui.emaculation.com>

## More wires go — now it's FireWire

### Wireless

Video cameras and external hard drives will go wireless by Christmas, following the announcement of the wireless FireWire specification.

The new standard will also see wireless digital TV set-top boxes, HDTVs and DVD players.

Wireless USB is also being planned by Intel and others.

Normal FireWire ports will work with the new wireless devices: all you'll need is an IEEE P1394.1 bridge which will be to FireWire what a Wi-Fi access point is to an Ethernet port.

The wireless FireWire standard has a maximum 55Mbit/s throughput in comparison to the 400Mbit/s of regular FireWire. It has a 100m range and operates in the same free-for-all 2.4GHz band as Wi-Fi.



SONY

Sony's Double Layer DVD Burner does twice the job, twice as fast.  
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The writing's on the wall. The new 700 series DVD Burner gives you almost double the performance of any previous Sony model. Not only does it burn at 8x speed and support +/- format (only by using upcoming double layer +R 8.5GB discs, you can store almost twice as much as before). Available in both internal IDE and external USB 2.0/Link versions, it's the DVD Burner that's in a class of its own. Call us on 1300 13 SONY or visit [sony.com.au](http://sony.com.au) for further information.

IT'S A SONY

Dual RW Drive  
Double Layer

# The great Australian disconnect

New high-speed fibre optic broadband bolsters the Federal Government's claims that Australia is a world leader in IT, but the reality is that many people are still stuck on dialup. Dan Warne investigates the state of broadband in the lead-up to the election.



Perth architect Mal Birch is one of the few PC users in Australia to have a glimpse of the future: not only is he connected to broadband,

but his house is linked directly to the Internet via ultra high-speed fibre optic cable.

Birch is part of the Western Power subsidiary Bright Telecommunications' trial of fibre optic cabling to the home. "The telephone service works just like a normal phone, but we can call our other friends on Bright fibre free of charge, and the Internet is amazingly fast and reliable," says Birch.

Almost unbelievably, he reports that the connection has never gone down and that he pays just \$45 per month.

But Mal Birch's experience isn't shared by the many thousands of Australians who are either paying for relatively sluggish ADSL broadband on top of ever-increasing line rental fees, or are unable to get broadband at all.

While Telstra is investing heavily, emerging faster forms of broadband will be restricted to the lucky few, creating a new class of broadband "haves" and "have nots". Telstra says it has 75% coverage of the Australian population with ADSL, but behind the massive growth in signups is a growing inequality, with only 25% of telephone exchanges enabled. A recent IDC



**Manhole politics:** Telstra's optic upgrade will see faster downloads for a lucky few, but the majority of the 2 million Australians with broadband will be stuck on copper.

study says that by 2008, Australia will have 2.8 million people (or 13% of the population) online with broadband, figures that make us a "broadband backwater" by world standards.

## DON'T HOLD YOUR BREATH

Fibre to the premises (FttP) is being promoted

by some industry analysts as a long-term solution to Australia's decaying copper telephone network, which Telstra has admitted is at "five minutes to midnight" — close to the end of its workable life.

More than 1,000 people are already hooked up to the Net via fibre optic cable as part of Bright Telecommunications' pilot scheme in the Perth suburbs, and its network can easily support 10,000. Another 60,000 have access to fibre in Canberra through TransACT. Telstra, too, is running a pilot in the Queensland suburb of Springfield, and an as-yet-unnamed real estate developer is set to announce a 2,000 home fibre-connected development in Melbourne.

These people will experience broadband most of us can only dream about — a single fibre strand has virtually unlimited bandwidth for future uses and can deliver 100Mbit/s broadband, plus high-definition digital TV and crystal clear telephony, including Voice over IP. That's great, but most providers say they probably won't enable the full 100Mbit/s capacity for broadband Internet initially because of the increased load that

## Mission Impossible: what it takes to get ADSL

Peter Debus appeared on *The 7:30 Report* last year, audaciously offering to pay Telstra the \$40,000 it would take to enable his small town outside Dubbo, NSW.

Debus went straight to the top — Telstra's CountryWide chief, Doug Campbell. "Campbell said that if people needed help, they should call Telstra, so I called him," he explained.

So what advice did Australia's largest ISP have for the broadband battler? "Doug said there was no way the Federal Government or Telstra was going to give broadband to towns that had the most money first."

Campbell told Debus to record his interest

on an online demand register, so he quickly rallied the support of 100 residents — 20 more than required. "Then [Telstra] rang everyone who registered and found that some didn't want to sign up after all," he continued. "So they told us to gather more names."

Community action has seen Telstra enable ADSL in 24 locations, with another 24 on the way, but at the time of writing Debus was still waiting. His company is currently paying over \$10,000 a year for ISDN and he is now working with the local council and the area's Telstra CountryWide manager to raise firm expressions of interest.

Tick the box for your favourite candidate

## How to vote

Is your modem speed even a remote priority in this election? We polled broadband experts and politicians on the best party to Vote 1 for broadband.

### Broadband

A

VOTE 1  
LABOR



**Paul Budde,  
Telco Analyst**

I'm not really partisan, but what I can tell you is that I knocked on Alston's door many, many times but it was a complete waste of time. Dazzling Daryl (Williams) is completely just on the topic. Will Labor do broadband better? I don't know. But I would like to see a change of government – at least a Latham government will bring something fresh to the table.

B

VOTE 1  
LABOR



**Simon Wright, Whirlpool  
broadband forum founder**

Broadband access is a critical factor in Australia's growth as an IT nation – a fact that Labor seems to understand better than the current Government. But all sides of politics are on notice from the Australian people – piecemeal strategies and token gestures are not enough.

C

VOTE 1  
LIBERAL



**Spokesperson for Daryl  
Williams, Liberal**

The Coalition is committed to telecommunications competition, which is the best way to deliver improved broadband services and lower prices to consumers. This strategy continues to bring dividends – with broadband prices now on par with dialup Internet. More importantly, other companies are beginning to rollout additional infrastructure including wireless and fixed line services. The Coalition has committed \$142.8 million towards a National Broadband Strategy action plan.

D

VOTE 1  
DEMOCRATS



**Senator Brian Greig,  
Australian Democrats**

The Democrats' greatest strength is advocacy. We have been successful in persuading the Government to introduce anti-spam legislation despite strong initial opposition and we have been progressive with open source policy. We advocate a national broadband infrastructure with substantial funding to make that possible. A country with such a vast geographical area but small population needs ubiquitous 6Mbit/s broadband.

E

VOTE 1  
LABOR



**Senator Kate Lundy,  
Labor**

Labor will remove the primary factor that is preventing the Howard Government from acting to strengthen competition in the telecommunications sector, and that is privatisation of Telstra. At the moment, ISPs are effectively subcontractors to Telstra, and Howard's competition policy allows that to happen. We will be able to use competition policy to drive investment in broadband with the aim of getting it to everyone, city or country.

would put on their back-end network.

The catch is that it's shaping up to be a "dress circle" technology – housing developers must contribute to the cost of installation in new estates. Its critics say this is a perilously patchy plan that lacks vision and will do nothing to help the vast majority of people who can't get broadband.

Telstra says it is moving towards introducing FttP instead of sinking any more money into installing traditional copper telephone wires into new developments. Only people who buy

a house in a yet-to-be-developed housing estate might be among the lucky few who can get fibre any time soon.

Ironically, when fibre to the home is finally rolled out in metropolitan areas, people who have moved close to a telephone exchange in order to get ADSL will be the last to receive it. They're the ones who will allow Telstra to continue to squeeze dollars out of its ailing copper network until it falls over.

#### FIBRE FAVOURITES?

The idea of a patchy fibre rollout starting with new greenfield estates has been slammed by critics, who insist that a fibre infrastructure should be built by an independent third body with all providers, including Telstra, competing for service provision over the network.

"The Government should be developing a nationwide plan to bring fibre to the home, as a national infrastructure program, just like roads or sewage," says the Australian Democrats' IT spokesman Senator Brian Greig.

"The plan should be to provide broadband coverage to all Australians with a minimum

6Mbit/s speed. And yes, we know that's expensive – but then again, so was the national rail network."

A spokeswoman for IT Minister Daryl Williams said the roll-out of a national fibre infrastructure was up to the carriers. "When there is clear demand for services that can only be delivered over fibre networks, the government expects the industry to respond by investing in these networks."

However, critics say the government isn't

moving fast enough and that other countries, including the US and Korea, are already benefiting from widespread fibre deployment. Meanwhile,

in Australia, fibre has only reached a pitiful 0.2% of the population.

#### ADSL HELL

As the demand for broadband inexorably rises, Telstra is coping more abuse from people locked out of fast Internet service.

The latest Telecommunication Industry Ombudsman statistics show that city dwellers are three times more likely to complain about the Internet than those in rural areas. Pacific Internet's Bruce Pyke recounts the story of one broadband-connected business in Sydney which found it couldn't get ADSL even though the shop next door was hooked up.

"It was incredibly frustrating. We provide broadband for the whole chain of stores, and this particular shop was already connected with us. When they relocated between shops within the same shopping centre, Telstra suddenly found it couldn't reconnect them," he says.

"They lost their mission-critical connectivity. It was completely ridiculous."

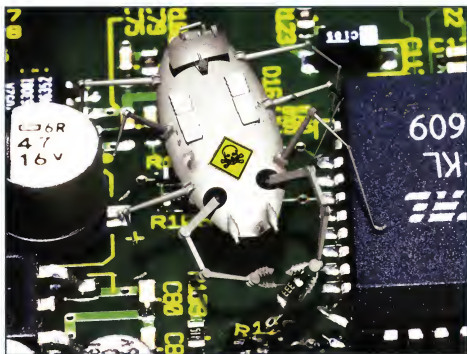
Telstra has responded to community concern by extending ADSL up to 4km from local telephone exchanges and expanding its program to enable suburbs without ADSL to catch up. Some people are even beginning to shop around for places to live based on whether they'll get broadband.

"I've been trying to get ADSL for four years now," reports Andy Chu, who lives between Morley and Beechboro in Western Australia. He moved house specifically to get connected to ADSL, and then discovered that Telstra's assurances he would get broadband were wrong.

"I moved into the new Bennett Springs estate on the basis that Telstra wasn't using the ADSL-incompatible RIM technology any more," Chu complains. "So I did a few preliminary checks before moving into this brand new estate. Replies from Telstra started with 'Yes, you can definitely get ADSL,' and went to 'No, you're on pair gain,' then 'No, your exchange isn't enabled.'"

It turns out that the entire estate was incompatible, Chu says. "And you know what's ridiculous? The main area of Beechboro can get ADSL, no problem. Telstra should be in the *Guinness Book of Records* for being the only telecommunications company that can knock \$20,000 off the value of a property before it's even blueprinted."

For now, the broadband revolution has passed Chu and others by. Fibre seeds seem a long way off when you're still stuck at 56Kbit/s – not even fast enough to be able to download a Windows Service Pack. **ITIE**



## Your CPU's hidden weapon

A new feature built into Windows XP Service Pack 2 is designed to use some advanced CPUs to jam bad code, but will it work? *David Braue reports.*

Forget antivirus software and firewalls, chipmakers are embedding security virus protection into CPUs themselves. Transmeta is the latest chipmaker to jump on board the emerging trend, adding "no execute" (NX) technology to its Efficeon chips. Intel and AMD are also adding the feature to prevent one of the most common attack vectors.

Is this the answer to increasingly sophisticated attacks? The 2004 Australian Computer Crime and Security Survey reports that a whopping 88% of computer-based attacks involved viruses, worms or Trojans and that 60% of respondents said they believed attacks were successful because of unpatched or unprotected software.

With users struggling to keep up with daily virus updates, the idea is that your PC can fend off virus attacks unaided. NX is the first time that a particular feature has been introduced into a mass-market chipset specifically for the purpose of tightening up security holes.

If you believe the hype, the payoff could be huge. "Implementing this feature would potentially stop around 50% of the viruses that have been designed to date," says Michael Aphorpe, technical manager with chipmaker AMD for Australia and New Zealand. That includes such notorious offenders as Slammer, Welchia, Sasser and MSBlaster.

AMD has included NX support in all of its 64-bit Athlon 64 and Opteron processors but it isn't the only company implementing the feature (which it will call Execution Protection). In addition to Transmeta, Intel currently supports NX in its 64-bit Itanium 2 processors, although desktop CPUs are reportedly getting it.

And it's not just Windows. While the technology has been developed between Microsoft and individual chipmakers, Intel and Linux vendor Red Hat released a prototype of code that adds support for NX to Linux in June.

### HOW CPU BLOCKING WORKS

NX is specifically targeted at resolving buffer overflows, a software loophole exploited by viruses. As a result of slapdash programming, buffer overflows are ubiquitous in both off-the-shelf software and custom-built tools. The increasing prevalence of viruses that exploit the loophole has increased awareness of the problem, but buffer overflows remain an all-too-real threat. Finding them is something of a hobby for bug watchers.

Trying to fix the problem by issuing patches has been like plugging a leaking dike with your fingers. NX is Microsoft's first attempt to go on the virus prevention offensive by fundamentally altering system design to stop buffer overruns the nanosecond they happen.

The idea is that CPUs will automatically check system memory for leaks that could result in buffer overflows. If such a leak is detected, the chip raises a flag, Windows identifies the offending application — which quite often is a virus — and stops it before it can do any damage.

Tapping into the bug has been honed to a fine art by hackers. Viruses feed an application a special combination of legitimate data — which fills the buffer — and malicious code that extends past the boundary of the buffer into another part of memory.

Another application, or the operating system itself, thinks the implanted code is a legitimate application and runs it — damaging files, opening up the system to remote control, or otherwise compromising its integrity. In this way, malicious code can be implanted on a system while circumventing any controls that would normally be in place.

In the past, almost all of a system's memory has been available to applications, with few restrictions. An NX-capable processor, however, works with Windows to keep a better eye on the status of system memory. Checkbits indicate whether each part of that memory has been allocated as executable — which means it's allowed to run applications — or non-executable, which means it's not.

NX marks all memory non-executable by default — when Windows runs an application, it instructs the processor to drop the flag protecting that area of memory. If an application attempts to write into a part of memory that hasn't been explicitly authorised, the processor detects the activity and raises a flag. This event is passed to the operating system, which immediately stops the offending application and raises an error message to tell the user what's happened.



## Stopping virus code from exploiting your RAM



**1** Before applications can access data in memory, they reserve a specific amount of memory — a buffer — for storage of data or application components. The computer uses the buffer's size to constantly plan and reassess its data handling, often placing different buffers in adjacent parts of the computer's memory or placing buffers near applications' memory spaces.

**2** Buffer overflows happen when an application writes more information to a memory area than it's been allocated. The extra information flows outside of the allocated space, potentially corrupting the information in an app or process that's running next to it in memory.

**3** NX technology prevents virus attacks by blocking executable code in memory buffer overflows.

This capability within Windows XP is called Data Execution Prevention (DEP). It's added to both 32-bit and 64-bit versions of Windows as part of the Windows XP SP2, but is only activated on systems with the NX capability built into them.

### NX: TOO DANGEROUS?

The only catch in this marketing dream is that NX doesn't just respond to viruses. It will also be triggered by poorly written applications or drivers that allow buffer overflows as a result of poor data handling. Such applications remain horribly common, particularly in high-pressure environments where inadequate testing or developer training has allowed potential problems to slip through.

The odds are that the system you're running now has buffer overruns happening every day, but your system is none the wiser. If your system had NX, however, it would be popping up flags every few minutes. Inadvertent design flaws that might not normally cause problems will now cause an otherwise legitimate application to stop dead in its tracks.

Microsoft faces a catch-22: by tightening buffer overflow security, it risks introducing application incompatibilities that could become show-stoppers if important applications are brought to a standstill.

Microsoft has moved early to address this issue, working with developers to educate them about how NX works and the increased need to ensure buffer overflows are

totally eliminated from all application code.

Danny Beck, senior product manager for Windows with Microsoft Australia, concedes that the introduction of NX could potentially cause interruptions for home and business users alike, but hopes the benefits will justify any inconveniences in the long run. "We need to work closely with the developer community to make sure they're writing correct code. It's difficult, but it really boils down to constant education of the market," Beck says.

Until that education is complete — and key applications are checked and double-checked to eliminate buffer overruns — 32-bit apps may

simply be too dangerous for chipmakers to introduce NX support.

With these dangers in mind, Microsoft has engineered a somewhat worrying

compromise into XP Service Pack 2, expected this month: users can disable the DEP feature if they want — either completely, or by specifying a list of applications that shouldn't be checked.

This could easily result in many people inadvertently switching NX protection off. Hackers could also modify the system registry, where the DEP feature is managed, to turn it off without the user even knowing.

In the future, users may not have a choice. As virus attacks continue to proliferate, pressure will undoubtedly increase on chipmakers to enable the feature by default. Virus blocking features such as NX could become a major selling point for CPUs alongside factors like clock speed and cache size. **ITW**

## As virus attacks continue, pressure to use NX technology will increase

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# Techies on tenterhooks

In the wake of its report on offshoring, APC asks the question: who, exactly, does the Australian Computer Society represent?

The peak body for tech professionals, the Australian Computer Society (ACS), has released a policy on offshoring that Dispatch believes sells out its members, panders to the Federal Government and indicates a right-wing agenda that makes John Howard look like a caring moderate.

The Policy Statement on Offshoring also represents a turning point in the lobby group's 39-year history. Edward Mandla was candid in telling Dispatch that his "presidential legacy would be to turn the ACS in to a policy-making machine".

Funny, the ACS's role used to be the simple job of representing its 16,000 fee-paying members. But this is the new ACS, one that appears to be in the vice-like grip of a small band of neo-conservative economic rationalists. And as Mandla told Dispatch, the offshoring policy statement is "very much" indicative of future directions. "I've always taken a stance of being practical, of being economic," he said.

The ACS policy acknowledges that such an approach will leave a "series of individual human misfortunes" in its wake. But unlike the US, where government contracts will not be sent offshore, Mandla doesn't want the same protection for Australia. "We've tried protectionism in Australia before. We're an advanced nation, we've proven that in the short term, protectionism protects jobs, but in the medium to long term, we don't compete well globally."

It must be nice to live in such an ivory tower of radical free-market economics. Respected academic Robert Manne argued that the main characteristic of economic rationalism is "a profound suspicion of all forms of state intervention in economic life and an almost equally profound faith in the beneficence of unfettered, or almost unfettered, market forces".

It can also be callous when dealing with people's livelihoods.

Like a how-to guide for offshoring, the ACS policy presents a set of guidelines,

checklists, templates and re-skilling schemes designed to show government and business that gutting the local industry in favour of cheap overseas labour isn't really so bad.

Apparently the trend for offshoring is actually something we can take advantage of, with a section even highlighting why Australia offers numerous benefits as an offshoring location. How stupid are we expected to be to swallow this twaddle?

For me, the worst aspects of the ACS's instruction manual for offshoring are its laboured attempts to present a backdown as a tough stand. In February, Mandla joined various union groups in proclaiming

offshoring "the mother of all issues". It was a major "election issue", he said as he talked up the US government's position.

Mandla

was more than happy to join the chorus of support for the anti-offshoring resolution passed at the ALP national conference in February that would require government agencies and organisations to buy local services.

Now Mandla says the Australian market has moved beyond mere programming. "Our industry is changing, it's no longer a programming-dominated industry. It has more of a business focus and will continue to have a business focus as we go forward."

In the US, analysts dismissed arguments that low grade IT work could be offshored while a country retained high value work. "If you don't have entry-level programmers, how do you get people to become systems architects, the high-level skills that we think are going to stay onshore?" asked Forrester analyst John McCarthy in a CNet interview.

It was a no-brainer. Offshoring was bad, and it could be stopped locally, as it had in the US, if momentum was maintained. The problem is that the government is bullish on big business exercising its right to maximise profits with cheap labour.

Or, as Mandla preferred to put it, "The

Government is very concerned to get [offshoring] out of the headlines."

The Australian Information Industries Association, representing the multinational IT vendors that want to offshore, has received enthusiastic support from the Howard government. Together, they've been accused by Labor of campaigning to support the offshoring of Australian jobs after the government portrayed as good news an AIA survey saying that offshoring was in its early stages in Australia.

ACS heavies then met with government officials and emerged with what could be read as a publicity campaign for business-friendly government policies that refuse to engage the same protectionism being applied by the US Government.

First, draft copies of the ACS offshoring report, prepared by Whitehorse Strategic Consulting for the ACS, were emailed to government ministers by ACS brass.

Then 90 pages of the 140 page report were suppressed. These suppressed pages documented abuses under a controversial program by which the ACS advises the Department of Immigration on the issuing of visas for foreign IT workers. The report had suggested that, given the industry's unemployment rate, perhaps the ACS should advise Immigration to make it harder to get a visa for Australia.

So why the backflip on offshoring policy? Mandla was stunned by the question:


"No-one's said that to me yet." But he did tell me that maintaining a good relationship with the government is important in order to remain influential. "[It's] absolutely critical. The end game is you've got to get favourable outcomes for your industry."

And working closely with government is beneficial for the long-term viability of an industry that Mandla sees himself shaping long after his stint as ACS president ends. "One would hope that if you do a really good job in the ACS that you might get called up for some meaningful advisory roles on some of the incubators or some of the government panels," Mandla said.

Of course, I can see it now. What could be more meaningful than sipping Moët with fellow right-wingers while discussing how you'll carve up the markets and shape economies. Sounds just terrific, mate.

gmontgomery@apcmag.com

**ACS appears to be in the vice-like grip of a small band of neo-conservative economic rationalists**



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## Goodbye to the keyboard?

Microsoft's Media Center is just the latest of a long line of weird PC designs — many of which you've never used.

If you believe the hype, by next year waves of PC users will be swapping keyboards for remote controls. The media PC trend will see x86 boxes planted alongside home cinema systems in lounge rooms, and massive wide-screen LCDs replacing today's 17in screens. It's potentially the biggest step in the evolution of the PC in decades. Haven't we heard all this before?

Check the history books and you'll find the lounge room PC is just one in a long line of world-changing PC designs. For years now, Intel, Microsoft and their ilk have been rolling out successively weirder ideas — '50s-style TV hybrids, keyboardless PCs, notebook/PC fusions and even stranger concepts. The blobby green 'Magic Bean' comes to mind.

Yet despite increasingly ambitious concepts, and no doubt hundreds of thousands of dollars invested in overpriced New York design studios, the PC still looks pretty much like the beige box unveiled in 1981, only smaller.

These so-called innovators have been pretty unsuccessful at inventing the PC v2.0. Not that there's anything wrong with that — it's great to dream, and these ideas are truly breakthrough material. Or would be, if they actually ever made it into reality.

This year's flagship is a keyboardless PC unveiled recently by Microsoft and HP. To be accurate, there is a keyboard, but it's hidden away in favour of a console covered in jog dials and buttons like a home cinema control, the idea being that some people spend more time emailing, talking and videoconferencing than typing. Info on mobile phone callers pops up onscreen (Bluetooth detects nearby calls) and you can switch to voice chat via the console. Dubbed Troy, it's pitched as "another step in the evolution of the PC into a communications device". HP also has a notebook designed around voice and instant chat called Hermes.

Don't hold your breath waiting for these new ideas to actually make it from the drawing board to widespread release. It's possible Troy may make the jump, though HP is keeping tight-lipped about a possible release. Previous concepts, including Microsoft's telephone-integrated Athens design, have also seemed like interesting notions, but failed to set the world on fire.

This isn't to say there aren't some great ideas making it into homes. Small box-builders with nothing to lose have been innovating for years

without much fanfare. Think about Shuttle, for instance, which sparked a wave of mini-PC designs. Do some Googling and you'll also find fanless systems, and PCs that look like home theatre components ([www.hushpc.co.uk](http://www.hushpc.co.uk)). One local builder, Development One, has made what is possibly the first lounge room PC to go on sale with a working electronic program guide (EPG) for recording Australian TV channels.

## Message to Microsoft: Why are we waiting?

Windows users are missing out on key features while Microsoft plays coy over a pre-Longhorn update.



Why is the software giant going to force users to wait until Longhorn to buy an operating system that integrates all the latest bells and whistles?

Once XP Service Pack 2 hits later this winter, Microsoft has said it won't roll out any other Windows desktop releases until Longhorn. Longhorn is expected in 2006 or beyond.

This makes no sense — especially for a company championing the concept of "integrated innovation."

Microsoft seems less worried about stealing Longhorn's thunder than it is about diluting its Windows XP marketing message. The company's "XP Reloaded" campaign is all about convincing hold-outs who are still running older versions of Windows to upgrade, while educating existing XP users about all the hidden features in their operating system.

But as the company redoubles its efforts on selling XP, interesting add-ons — such as better updated desktop-search software, a more sweeping instant messaging client, an upgraded streaming media player, a built-in RSS reader and the like — will remain just that: add-ons. They will be available only to those customers who specifically seek them out and download them.

Originally, Microsoft had different plans. It contemplated an interim release of Windows, officially codenamed "Oasis," but which many insiders affectionately referred to as "Shorthorn." But the powers-that-be decided

William Maher



Whether these ideas can go from hobby to lounge rooms isn't clear. Even one of the few significantly different designs to see light of day, Microsoft's Tablet, has had mixed success. The pen computer has been a hit with doctors and the real estate industry, but people have been hesitant to "take a chance" on the new shape according to analyst group In-Stat/MDR. No surprise then that PC makers are holding back on *Star Trek*-style multimedia consoles.

And if they're sceptical about that, what does that say about the future for remote control PCs? Have your say by emailing [epinions@apcmag.com](mailto:epinions@apcmag.com).

Mary Jo Foley



to nix that release.

There is, however, another rumoured interim release, known as "Windows XP Premium"; the fate of which remains uncertain. Premium allegedly consists of a bundle comprising Windows XP and Windows Media Player (WMP) 10. WMP 10 is available for download now from [www.microsoft.com/windows/windowsmedia/default.aspx](http://www.microsoft.com/windows/windowsmedia/default.aspx) (see review on page 52). Unlike the situation with Shorthorn, XP Premium still may be in the wings.

I think Microsoft should get off the pot. The Redmondians should provide a consumer-specific XP Premium release later this year.

**What's your advice for Microsoft? Should it deliver Premium or not? Would two Windows releases (Premium and XP SP2) in one year be too much? Email us at [epinions@apcmag.com](mailto:epinions@apcmag.com).**

Bill Gates probably regrets ever agreeing to an interview with Mary Jo Foley back in 1984. Since then, she's hitched rides on Microsoft campus shuttle buses, been blacklisted from company functions and provided ringside coverage of numerous events, from Microsoft's Windows 95 launch to the antitrust debacle. In the past, Foley's fired broadsides through her column "At the Evil Empire" (and more recently as editor of *Microsoft Watch* ([www.microsoft-watch.com](http://www.microsoft-watch.com))). Stay tuned as Foley sounds off exclusively for APC on Longhorn and more each month.



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## Think global, invest local

Senator Kate Lundy's letter (*APC* July, page 32) demonstrates Labor's backward looking approach to ICT policy, which can only stifle development of Australia's ICT sector and block valuable foreign investment.

Unlike Labor, the Government does not pretend that globalisation can be stopped. Australia's challenge is to ensure we benefit from this phenomenon and take advantage of all opportunities to develop and grow our ICT industry, particularly in the high-value end of the market.

There is evidence to show that globalisation is presenting significant opportunities for Australian industry and that those opportunities are being seized by our local companies with some gusto.

For example, since July 2003, Australia's ICT industry has won more than \$580 million in new investment and contracts from countries, with the potential of up to 1,750 new jobs for Australians.

Australia can compete with anyone in the world in ICT. Among other advantages, we have a highly educated, productive and multilingual workforce, a strong pool of ICT skills, a cost-effective labour market, a world class IT infrastructure, and a stable and supportive political environment.

Invest Australia continues to sell this message to the world through the Technology Australia brand and the ICT Investment Attraction Strategy. It is currently working with companies, including ICT companies, on projects with potential investment in Australia of more than \$90 billion.

Unfortunately, Labor has demonstrated its blinkered approach by flagging its intention to abolish Invest Australia, despite its success in selling the high quality and effectiveness of Australia's ICT sector internationally.

Instead of promoting our vibrant ICT sector, Labor is opting for the fortress approach of banning offshoring and hoping everyone will just leave Australia alone.

This approach not only denies multinational companies the opportunity to invest in Australian industry and create jobs, it prevents Australian companies from expanding their markets overseas.

Senator Lundy also attacks Australia's Free Trade Agreement with the United States, despite the fact that it gives our ICT companies greater access to the massive US Government procurement market.



*Vote for me: passions are running high in the debate about Australia's ICT industry.*

The FTA also prohibits any US protectionist measures aimed at offshoring applying to Australia. This means Australia can keep winning offshoring work from the US. A recent Meta Group report found that Australia and New Zealand rank [equal] second after India as offshoring destinations for US companies, ahead of China, Canada and Ireland. (See "Dispatch", page 26.)

Senator Lundy's criticisms of Government efforts to support and promote Australia's ICT industry are predictably short on facts.

She would be better off doing some serious research into her portfolio and ensuring that Labor has something practical and useful to offer Australia's ICT industry, other than broad platitudes and mindless criticism.

**Daryl Williams**  
Minister for Communications,  
Information Technology and the Arts  
Canberra, ACT

### CRITICISM OF BIGPOND POINTLESS

Entry-level broadband plans have prompted tens of thousands of Australians to stick a metaphorical toe in the water with fast Internet and the many benefits it has to offer.

But judging such plans, particularly Telstra BigPond's \$29.95 200MB per month offering, against the usage patterns of "power" users (*APC* June, page 106) was pointless.

Such plans are aimed at light users who want to experience broadband without a major monthly financial commitment, or who find 200MB per month covers their usage of things such as Internet banking, occasional Net surfing or email. As we have said in our

## Letter of the month

When will the Federal Government act? They've passed a law to regulate spam which will punish ISPs if they let spammers operate on their networks, but they're doing nothing about viruses.

We all purchase a service (email) and it performs poorly — it may even damage our computer and its data. Is the ISP responsible? Of course not; we signed a contract which lets them off the hook.

Rubbish! In this country if you purchase a product which doesn't perform as you were led to believe, you are entitled to a refund. I don't see ISPs coughing up every time you get a virus. The words "merchantable quality" don't seem to apply to ISPs. Just because it is a billion dollar industry and the bulk of it goes into Government coffers, should we all be made to suffer?

My ISP (Pacific Internet) offers free virus filters on its email servers, as do some others. This should be mandatory for all providers. If it were against the law for an ISP to transmit a virus, I guarantee they would act quick smart to stop virus-infected users' network traffic, and the problem would be gone forever.

It takes four entities to pass on a virus: the sender, the receiver and the two ISPs in between. If the Federal Government were to regulate ISPs (as they are empowered to now) to prevent the spread of viral code, we could claw back a working and fast Internet which would be better for everyone.

**Richard Leahy**  
Roma, Qld

ISPs won't like this point of view, but Richard's idea is certainly ripe for debate. He wins our Letter of the Month prize, a Logitech Cordless MX Duo, valued at \$199.95.



advertising, 200MB gets you 2,000 emails plus 1,000 Web site visits plus 20 song downloads.

In addition, our members get free or unmetered access to great sites such as BigPond Music, AFL.com.au, V8 Supercars and GameArena, plus a range of member discounts.

I also want to refute categorically the claim that growth in the broadband market has caused strain on Telstra's network (APC June, page 114).

Recent customer growth has had absolutely zero impact on the reliability of the cable broadband network. Instead, all your story points to is several isolated cases of gaming performance being affected at peak times.

**Justin Milne**  
managing director, Telstra BigPond  
Sydney, NSW

#### BIGPOND A DISGRACE

Telstra BigPond broadband is the most disgraceful product since the Ford Gremlin!

I had five usable email addresses on BigPond.com dialup included with the monthly fee, but it seemed ADSL was the way to go so I took up Telstra's offer to upgrade to broadband.

What a disaster! There aren't enough people manning the call centres to provide customer assistance. There are resources, I notice, to bill you an extra dollar a month for each email address above the single one included.

I don't know how your reporter Dan Warne got any satisfaction from cheap ADSL plans (APC June, page 106), but in Telstra's case it was oversold and under-planned. Deals and speed are all very well, but service — that's another issue entirely.

There is a lot of bullsh\*t around cheap broadband, and it emanates from Telstra.

**Steve Honsen**  
Narara, NSW

Dan Warne responds: You're right, Steve, service is one of the great "unquantifiables" when it comes to reviewing ISPs. The Australian Broadband User Survey by Whirlpool.net.au gathered the views of more than 10,000 Internet users late last year, and we published the full results (APC February, page 76). In Whirlpool's survey, 73% of respondents described BigPond ADSL's service

as "average" or "awful". At the other end of the scale, Westnet and Internode rated best.

#### ISP INSTALLATION CHARGES

The latest APC article on broadband (APC June, page 104) claims that Telstra's wholesale charge for connecting a DSL service is \$80. That's an ex-GST figure, so the real number is \$88.

When the real costs of handling the setup are included, factoring in the significant staff overheads of begging Telstra to fix stuff-ups, the true costs [of connecting a service] rise substantially above that.

Without making it 100% clear that this \$80 is the wholesale charge before operating and interfacing costs to Telstra are added presents an inaccurate picture, in my opinion, and illustrates the dangers of taking a single number out of context.

Recently, Telstra managed to get national press coverage by comparing a wholesale access charge to a \$29.95 retail cost. Never mind that this was for bare 256K ADSL ports, minus GST, minus the cost of delivering data to the exchange, and minus many other related costs. Because of this fracas, I am even more sensitive to miscomparisons that don't factor in the GST than I used to be.

**Simon Hackett**  
CEO, Internode  
Adelaide, SA

#### VARIETY THE STRENGTH OF OPEN SOURCE

APC's William Maher wrote: "Server OS, geek plaything, business tool, consumer brand — for each and every option there's a team out there pursuing the dream." (APC April, page 100.)

With those words, you put your finger firmly on one of the open source community's secrets of success. Each of those teams is free to pursue its own goals. There are no marketers, managers or budgeters to forbid them, weigh them down with paperwork or misdirect their efforts toward some narrow corporate interest.

That freedom is what has made it possible to expand into so many disparate areas at the same time. You didn't even mention embedded applications, which are growing rapidly as real time kernel features and porting tools mature.

Nobody denies that a good deal of work remains to be done before the general public will feel at home with GNU/Linux, but those teams you mentioned are going at it full throttle. From here on, it's just a question of time.

Can it be stopped? I keep waiting for Microsoft to spring some kind of attack, but so far they're acting like a deer in the headlights.

**Jack Corroll**  
Noshua, New Hampshire, USA

## Agenda: Your place to vent

While I agree with the Australian Consumers Association that it's reasonable to expect a retailer to advise a consumer on virus protection (APC March, page 13), I disagree that providing virus software is necessary or that virus-related problems should be covered under warranty.

If hardware is faulty, it should be covered, obviously. But what if the consumer doesn't update their virus software? What if little Johnny turns it off to make Quake run faster? Why is this the retailer's fault?

Why not get your ISP for not protecting the Internet connection? Why not go the electricity company for supplying the power to the ISP that connected you to the Internet to get that virus? For that matter, why not have a go at the phone company whose lines were used to connect to the Internet to get the virus? Or Apple for the GUI interface that inevitably made us all click-happy?

And what about your mum? Should we blame her for your PEBKAC (Problem Exists Between Keyboard And Chair) error?

**Jason Dow**  
Sunshine Coast, Qld

#### MICROSOFT MONOPOLY A MYTH

I am absolutely flabbergasted at the constant lawsuits and actions against Microsoft, such as the recent European Union record fine and ruling that Microsoft has to provide competitors with parts of Windows proprietary code.

Firstly, the Microsoft monopoly is a myth. As long as there are other operating systems out there such as Linux, BeOS, OS/2 or even good old DOS, Microsoft does not have a monopoly, merely a very large market share. There is absolutely nothing preventing competitors from developing operating systems that run their software properly and marketing them head-to-head with Windows.

Secondly — and more importantly — Windows is a proprietary product and Microsoft is under no obligation whatsoever to ensure that software from competitors is compatible or even runs at all under Windows. Apple has been doing this for decades without being persecuted.

Microsoft has the right to code Windows to specifically preclude operation of software ▶

## Error Log

In APC May (page 158), the price of Mike Meyers' A+ Guide To Managing and Troubleshooting PCs was incorrectly listed as \$48.50. The correct price is \$104.50.

► from its competitors. General Motors isn't forced to ensure that components of smaller car manufacturers fit into GM vehicles and, in fact, uses different sizes of items to ensure this doesn't occur.

The notion that Microsoft should be forced to reveal its source code to competitors is ludicrous. This is like Coca-Cola being forced to reveal its secret formula to rivals because Coke outsells them by a factor of 10.

It is grossly unfair to try to prevent Microsoft from bundling software such as Internet Explorer or Media Player with Windows, as Microsoft should have the right to produce and market its software in any form and provide any accessories and facilities it chooses, providing no copyright or patents are breached. Computer game makers aren't screaming because Microsoft bundles Solitaire with Windows. Windows XP comes with an integral firewall, but none of the commercial firewall vendors are bitching about it.

If I were Bill Gates or Steve Ballmer, I would give the European Union an ultimatum — drop the fine and code disclosure ruling and leave Microsoft alone to innovate and to include what it sees fit for its clients or Windows will be totally withdrawn from sale in Europe and sold from the US by mail order or over broadband. The European Commission would be rendered totally impotent in this matter, and rightly so.

**Ziggy Malter**  
Dural, NSW

## KAZAA'S CONTRADICTION

Sharnan Networks claims that it shouldn't be held responsible for the actions of its users, but thinks search engines should be responsible for users distributing copies of K-Lite?

To threaten legal action against search engines for not blocking sites that contain illegal versions of Kazaa but dismiss legal threats against them for not blocking copyrighted music totally contradicts their own argument that they're not responsible.

**Anthony Webb**  
Springwood, Qld

## Have your say

Add to these discussion threads or mail your views (in less than 500 words) to [epinions@apcmag.com](mailto:epinions@apcmag.com).

All correspondence becomes the property of APC and is subject to editing. Letters sent to [epinions@apcmag.com](mailto:epinions@apcmag.com) must include the writer's full name, suburb, state and phone number to be considered for print publication and in the running for letter of the month prizes. Phone details will not be published.

## Prize Pit

The lucky winner of our June subscription prize of a Brother MFC-9180 Laser Multi-Function Centre is C. Bull of Oxley, ACT. Our 10 runners-up will each receive a Brother MFC-3220C Colour Multi-Function Centre. They are D. Cox of Earlville, Qld; D. De Zylva of Glen Osmond, SA; D. Forrest of Busselton, WA; S. Hazlewood of Yagoona, NSW; A. Ironside of Westleigh, NSW; R. Bartlett of Nundah, Qld; M. Agnew of Watsonia, Vic; S. Harkins of Morwell, Vic; T. Schenkel of Myrtle Bank, SA and S. Youle of Cowle, Vic. Congratulations.



## AN AUSTRALIAN FIRST?

I made a shocking discovery while visiting the Apple Store in Atlanta, Georgia. The US price of the upgrade version of DVD Studio Pro 3 is US\$214 including sales tax. This translates to roughly \$316 — \$16 more expensive than the retail price in Australia. This must be a first!

At first I thought this might have just been anomalous pricing on one product. But I checked the 15in PowerBook and while the US price is about \$60 cheaper than the Australian price, it is effectively \$124 more expensive to buy it in the US because of the GST you're required to pay on imports.

I suspect the same is true for other products released by Apple in Australia, and is due to the strength of the Aussie dollar against the greenback. Apple seems to be doing the right thing by Aussies, which is more than can be said for many of the other major brands.

I don't know how long it will last, considering the way the Aussie dollar is dropping — hopefully Apple won't act like the banks, passing on the price hikes immediately after having taken so long to pass on the savings from the strengthening dollar.

One other thing — if you are in the US you can buy the prepaid iTunes Music Store cards in any Target store, which makes it possible to use the iTunes Music Store back in Australia. I did have to create an Apple ID using the address of my hotel in Atlanta, though.

**Ivar Hosteng**  
Eastwood, NSW



## The Ricoh Aficio 2238C. Complete document management with colour on demand.

The new high speed Ricoh Aficio 2238C is a brilliant multifunctional document manager that's remarkably easy to use.

You can colour scan to-email, to-desktop or to-document server, fax effectively and of course create startlingly beautiful colour documents when you need them.

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Other features of the Aficio 2238C include:

- Up to 28ppm in colour, 38ppm in b&w - single or double sided
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**RICOH**  
Image Communication

# A great deal?

The price was fantastic at \$991, the system specifications amazing, it won Editor's Choice in APC — but many readers discovered they couldn't buy the Advance 1000 PC.

Readers' letters have been pouring in about our PC Megatest Editor's Choice (APC June, page 78), the PC Xpress Advance 1000. In our review, we noted that the system was outstanding value for \$991, including an 8x DVD burner, 120GB hard disk, Gigabit networking and high-quality Kingston RAM. The only problem? Many readers reported that PC Xpress wouldn't sell the system to them.

Dear Watchdog,

If you go to the site [www.pcxpress.com.au](http://www.pcxpress.com.au) you will immediately note that the Advance 1000 has "Limit Reached" posted across it and a note saying that 1,000 units had been sold, [this amount] being the entire "promotion". From reading your assessment in the June edition of APC there does not appear to be any note that this is a "brief special".

A new model, the Advance 1100, is being advertised, but although there is some product specification detail in the ordering screen, the

brands aren't mentioned. As a result, it is impossible to determine if the unit is comprised of the same or better components than the Advance 1000 you tested.

I was enthusiastic about buying an Advance 1000 on the basis of your test, but have now gone rather cold on it.

Chris Ostler  
via email

Watchdog checked the PC Xpress Web site and was surprised to discover that not only was the Advance 1000 sold out, but the more expensive Advance 1100 model was labelled with the APC Editor's Choice logo — even though that model was never reviewed.

We contacted PC Xpress immediately to direct them to remove the logo and request an explanation as to why the \$991 model had sold out so quickly.

We pointed out that when the review machine was requested, we weren't advised



Nice try: PC Xpress "sold out" of the Editor's Choice system APC reviewed, then slipped the logo on a more expensive model.

that the model would only get a limited production run. In fact, if we'd been told that, we wouldn't have accepted the machine for review!

PC Xpress's IT manager, who asked that his name not be published in the magazine, said the promotion's allocation of 1,000 machines had sold out within "about a week and a half". He added that he couldn't build any more because the Logitech Z-340 speaker system bundled with the package had been unexpectedly discontinued, and the price of RAM out of Taiwan had shot up.

Selling 1,000 systems equates to almost \$1 million dollars' revenue. Watchdog asked

## Refills a raw deal

Dear Watchdog,

I want to warn anyone thinking of purchasing Calidad refill kits not to. I own an Epson Photo 700 and while printing a report I needed straight away, I ran out of colour ink.

Off to Kmart I flew, but they had none available — not even a non-genuine cartridge left. So in desperate need I grabbed a refill kit, thinking in horror of the mess I'd made years ago when I tried one. But hey, I thought, they should have improved. Here's what happened.

I get home and the kit's only got three colours, but the printer has five. Maybe they have mixing instructions, so I open it. No. Check the pack. Yep, it says for Epson Photo 700. I have no choice but to mix them myself to try and get some sort of colour out of it. The graphs may be the wrong colour but at least the reader might be able to tell the difference between each one. Nope, the cartridge won't send anything but a bit of red, a tiny bit of yellow and the rest black.

So my warning to readers is: don't buy a refill. Stick with the manufacturer. Calidad didn't even have a Web page, though they do print an address on the label.

Daniel Di-Giusto  
Highton, Vic

Dear Watchdog,

At Calidad, we are always concerned to hear of a customer who has experienced difficulty with refills. Refills do require a little extra patience, but customers are saving up to 80% on the cost of the OEM product. Customers who are short of time may prefer to save money by using Calidad cartridges instead of the Calidad refills.

In Daniel's case, however, we admit that we have made a mistake in the information on the pack. We have since rectified this and thank Daniel for bringing it to our attention.

A three colour refill cannot be used in a five colour cartridge, and regardless of which

manufacturer's ink you have, colours should never be mixed because the inks have different viscosities.

We would be happy to reimburse Daniel for any out-of-pocket expenses he has incurred and we would like to send him a complimentary set of products for his printer in the hope he will give us another try.

Gl Avenaim  
marketing manager  
Calidad

Calidad does have a Web site, but it was offline for maintenance at the time Daniel and APC were trying to access it. At the time of publication, it was back online. Daniel later contacted Watchdog to say that he was extremely impressed with Calidad's response, noting that they had sent him a full set of cartridges, A4 photo paper, 4R photo paper and a cheque to reimburse associated costs.

## Contact us

### WE WANT TO KNOW

how IT companies are really treating you. Letters must be under 500 words and include your full contact details and any product information. Write to: [watchdog@apcmag.com](mailto:watchdog@apcmag.com) or PO Box 4088, Sydney NSW 1028. All correspondence becomes the property of APC and is subject to editing.

**whether it was normal for a tier-3 computer business to turn over this amount in 10 days.**

"Turning over millions [of dollars] a month is nothing really. I could spend \$20 million and just make 2% out of that," he said. "It's unfortunate that they got snapped up by people who weren't readers [of APC], but I can't help that."

"We can't do anything about it now because we can't get the cheaper pricing any more," he said. "A lot of people are calling [based on] the magazine [review] and we came out straight away with the Advance 1100, which a lot of customers are happy with. I think we've sold about 200 of those."

"We made it fair with the Advance 1100. We upped the CPU speed to 3,000 [AMD processor rating] and we're offering a flat screen CRT monitor rather than the bubble-shaped one that came with the 1000."

"If I tried to build the Advance 1000 now, it would cost me money... probably an extra \$60. We reserve the right not to make a loss."

"I suppose for the next promotion we have to think seriously and not rely on solid pricing at the moment, because anything can happen in this industry."

**Logitech Australia told Watchdog the "unexpectedly discontinued" Z-340 speaker system had not been officially distributed in Australia since October 2003.**

"It was discontinued at the end of our Spring 2003 catalogue," Logitech spokesman David Tennant said. "Distributors are given months of notice that products are being discontinued, because the last thing Logitech wants is to bring out a new product while stock is still on retailers' shelves — they would be happy!"

**At the time of writing, the Logitech Z-340 speaker system was still listed as an add-on for the more expensive Advance 1100.**

Watchdog consulted the Office of Fair Trading NSW for advice about readers' rights in relation to PC Xpress. A spokesman, Norman Cossey, said that while he couldn't

## Cable: slower than dialup?

Antun Pecar from Narraweena, NSW, knew his OptusNet cable speed would drop if he exceeded his download limit — but he didn't expect it would drop to the equivalent of a 1980s 300 baud modem!

"I've been following the Telstra broadband nightmares suffered by some of your readers with interest, at times thinking that I am immune to such catastrophes — I am with Optus Cable after all," he told Watchdog. "But Optus struck with a vengeance this month."

Pecar explained that he's generally happy with his cable speeds, which average 3Mbit/s (equivalent to 375KB/s) on downloads.

When he exceeded his download limit in May, he expected to have his download speed limited to the advertised rate of 28.8Kbit/s (approximately 3.5KB/s). "But speeds have been much slower," he said. "For example, I received six emails totalling 255KB and it took from 7:40am until 9:05am — 85 minutes — to download. That's 0.4KB/s!"

Pecar asked if Optus was deliberately reducing speeds to well below the rate stated in the contract to either punish users who exceed the download limits or force them to subscribe to a higher download limit plan?

"I have used 28.8Kbit/s modems on the same system and can vouch that it does not take 85 minutes to transfer 255KB of data."

Optus public affairs manager Melissa Favero responded: "Our speed limiting is around 28.8Kbit/s. Note that this is kilobits not kilobytes... sometimes this creates confusion. If a customer has an email virus on their computer, they may be sending an

excessive amount of outbound email causing upstream saturation and limiting the download speed to less than 20Kbit/s. P2P software may potentially slow download speed due to upstream saturation. Customers should check default settings to make sure their P2P program has not turned their PC into a server."

Pecar's original letter showed no confusion about the definition of kilobits and kilobytes. Watchdog asked Optus to further investigate the issue, however we did not receive a reply.

Pecar was later contacted by OptusNet technical support which advised that he should change his maximum packet size to 576bits because "dialup can't support packet sizes larger than that."

Even though cable is not dialup, changing

the packet size using the TCP/IP Optimiser program from [www.speedguide.net](http://www.speedguide.net) did the trick, allowing Pecar to download files at roughly 28.8Kbit/s speed.

"But then there was a twist in the tale," he told Watchdog. "When the first day of the next month rolled around, my cable didn't go back to full speed. I rang Optus, and they said they were having problems getting people who'd gone over their limit the month before back to full speed." Pecar said by 10pm that night his cable was running well again.

Pecar's experience may be an anomaly, but it does highlight the risk involved in "unlimited" plans with "soft limits". For some people, broadband plans with a fixed but more generous download limit may be the better choice. You can compare 40 plans in our broadband directory on page 149.

**comment on PC Xpress specifically until a member of the public made a formal complaint, he could offer this general advice:**

"When advertising a sale, retailers must make sure that reasonable supplies of the product are available for purchase."

**When Watchdog asked what a "reasonable" supply was, Cossey explained:**

"It depends on the type of goods for sale, the terms of the sales advertising and the previous sales experience of the trader. It would, for example, be reasonable for an electronic goods

retailer to have half a dozen washing machines for sale, whereas it would be unreasonable for a clothing retailer to have a sale on six skirts without disclosing that stocks were limited."

Cossey said any readers concerned about PC Xpress's conduct should take the matter up with the Fair Trading body in their state for formal investigation.

## Error Log

In APC July (page 18) the URL for the CSIRO's Panoptic search site was incorrectly listed as [www.panoptic.com](http://www.panoptic.com). The correct address is [www.panopticssearch.com](http://www.panopticssearch.com).

# Panasonic



The idea.  
When you shake,  
it doesn't.



DMC-FX1  
3 Megapixel 3x optical zoom



DMC-FX5  
4 Megapixel 3x optical zoom



DMC-FZ2  
2 Megapixel 12x optical zoom



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## True idea It's the assistance of only the very best.

We've all had a perfect shot ruined by shaky hands. Which is why Panasonic has developed the world's first compact digital still cameras with Optical Image Stabiliser. This breakthrough technology corrects for handshake so every photo is perfectly sharp and free of blur. Even at slower shutter speeds for night or indoors, you get crisp, clear shots. Which is a great idea for capturing those wild moments. [panasonic.com.au](http://panasonic.com.au)



LUMIX



OPTIONAL  
1GB SD Card

**Panasonic**  
ideas for life



# OnTest



Detailed product reviews and comparisons

## Labs Challenges

### 62 Hardware ATI Radeon X800 Pro video cards

With ATI's latest round of performance cards hitting the shelves, and rival companies fighting for market share, *Asher Moses* reckons it's a great time for gaming.



### 64 Hardware Digital cameras

As technology relentlessly advances, the capabilities of digital cameras continues to impress. *Valens Quinn* rounds up the latest 5 and 8 megapixel releases.



### 74 Hardware 19in CRT monitors

While LCD monitors are the flavour of the month, there's life yet in CRTs. *Nick Race* examines seven top contenders.



### 80 Software Personal databases

Today's PCs are capable of handling the sort of sophisticated database apps that were once the exclusive province of powerful mainframes.

### 84 Upgrade Expert

*Jarrod Spiga* examines the benefits of switching to DDR2 RAM and exposes the potential pitfalls of upgrading your wireless network.

### 87 Totally Wireless

The wireless revolution is in full swing and APC rounds up a collection of routers, ADSL modems, USB, PCI and PC Card adaptors for the home or office.

### 40 Hardware PCI Express

*Matthew Overington* introduces the biggest change to the PC platform since the launch of the Pentium processor.

### 44 Hardware Double Layer DVD burners

Now that they've finally arrived on the domestic market, *Nick Race* tests the latest Double Layer DVD burners from Sony and BenQ.

### 46 Hardware AMD Socket 939 Athlon 64 FX-53

The Athlon 64 FX-53 processor has switched sockets, but Microsoft is still unable to release a compatible OS.

### 48 Software InstallShield X

InstallShield makes managing and deploying software a snap, even if you're not a programmer.

### 50 System Dell AXIM X30

Dell has launched its most potent weapon in the battle for PDA supremacy with a powerful addition to the AXIM line.

### 52 Software Windows Media Player 10

The latest version of Windows Media Player 10 is evolutionary rather than revolutionary.

### 52 Hardware Panasonic e.View 17in LCD

Panasonic's new flat panel screen for the home and office is more suitable for work than it is for play.

### 54 Software ZoneAlarm 5

Zone Labs finally adds antivirus support to its leading online privacy and security suite.

### 54 Software REALbasic 5.5

A fully-featured programming language that's simple to use? Visual Basic could be facing some competition.

### 56 Hardware Epson PictureMate

With digital camera sales booming, the dedicated photo printer market is expanding. Epson's newest contender impresses.

### 56 Hardware Dell 922 Printer

Dell brings its volume economics to the multifunction printer market with a \$219 stunner.

### 58 Best buy Sub-\$2,000 desktops

Even without a monitor, the value in desktops below \$2,000 is stellar. *David Lin* rounds up four top machines.

### 60 Best buy Dothan notebooks

Intel's Dothan CPU breathes new life into the Centrino platform. *Matthew Overington* rounds up four contenders.



## Inside APC Labs



**Editor's Choice:** This is awarded to the product that offers the best blend of features and performance. This product stands out above the competition as simply the best in its field. A product must score 4.5/5 to qualify.



**Highly Recommended:** Awarded to products that don't quite make Editor's Choice, but still stand out due to a particular feature or overall performance. Any product scoring 4/5 qualifies.



**Best Value:** as APC hands out Editor's Choice and Highly Recommended awards based on features and performance, often there's a standout product at a low price that misses out. Check out the Price-to-Performance Ratio box for more details on how this award is decided.

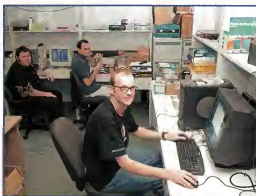
One of the perennial issues with testing any product is ensuring the tests are fair, unbiased and repeatable. System benchmarking is taken very seriously at APC, as it provides hard data to directly compare the performance of different platforms and components.

Although games are pushing the limits of PC architecture, office suites have varied little for the last few years. APC uses a range of business and multimedia-oriented benchmarking suites from Ziff-Davis to put desktop PCs through their paces.

The most recent additions to the suite are Business Winstone 2004 and Multimedia Content Creation 2004. The former is comprised of Microsoft Access 2002, Excel 2002, FrontPage 2002, Outlook 2002, PowerPoint 2002, Project 2002, Word 2002, WinZip 8.1 SR-1 and Norton AntiVirus Professional Edition 2003. The latter consists of Adobe Photoshop 7.0.1, Adobe Premiere 6.5.0, Macromedia Director MX 9.0, Macromedia Dreamweaver MX 6.1, Microsoft Windows Media Encoder 9.0.0.0.2980, NewTek LightWave 3D 7.5b and Steinberg WaveLab 4.0f.

APC adds a notebook-specific benchmark when benchmarking portables called MobileMark 2002. This simultaneously tests notebook performance and battery rundown time.

Each of these benchmark applications returns a number at the end which can then be compared to the results of tests run on other hardware.



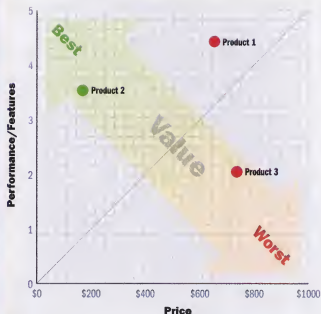
*It all starts here: endless hours of benchmarking and testing in APC Labs form the foundation of all reviews. The Labs team (from left): Nick Roca, Jarrod Spigo and Matthew Overington.*

One area of the PC that's still progressing in leaps and bounds is the graphics subsystem. As new platforms are launched at least once a year, the onus is on APC to use a mixture of reliable benchmarks and new tests that push the DirectX 8.1 and 9.0 capabilities of the current generation of video cards.

Dedicated 3D tests from Futuremark form the cornerstone of our 3D testing, but these must be backed up with real world game tests. Our current test suite includes applications as old as Quake 3 right the way through to the latest releases such as Far Cry and Halo. This enables us to gather extremely detailed information on the performance of a particular card and evaluate it relative to others being tested.

**Matthew Overington**

## apc price-to-performance ratio



APC is always looking for effective ways to communicate product value to readers in the context of a Labs Challenge.

Although products can be grouped into general categories, it's rare to find a number of items that offer the same feature set and performance at a common price. This makes it difficult to fairly and accurately compare a range of similar products, so we've introduced the APC Price-to-Performance Ratio.

Essentially, it's a scatter graph, with each point representing a reviewed product. The X-axis provides a price scale, and the Y-axis indicates features and performance as derived from the verdict awarded to each item. Products competing in Labs Challenges will be placed on the chart as dots according to their price and features/performance.

The diagonal line represents a line of expectation — as prices increase, a proportional increase in features or performance is also expected. Any product that falls below the line of expectation can be considered overpriced for its features or performance, while any product above it represents good value for money.

On our sample graph, Product 1 offers the best performance and features, but is more expensive than the two other tested products. Product 2 offers the best value for money, but doesn't include the advanced features found in Product 1. Lastly, Product 3 falls well below the line of expectation, indicating that it's overpriced for its limited feature set.

Key words for your company:

**mobility,  
mobility,  
mobility.**

Maximum mobility equals maximum productivity.

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Light briefcases mean  
happy users.



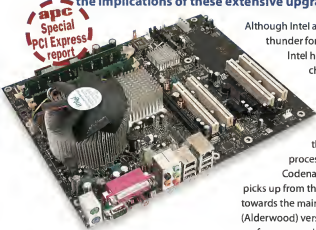
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Power to run the most  
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Wireless connectivity and some features may require you to purchase additional software, services or external hardware. System performance, battery life, wireless performance and functionality will vary depending on your specific hardware and software configurations. See [http://www.intel.com/products/centrino/more\\_info](http://www.intel.com/products/centrino/more_info) for more information. ©2004 Intel Corporation. Intel, Intel Inside logo, Intel Centrino and Intel Centrino logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. All rights reserved.

# Intel's next-generation chipsets

Matthew Overington introduces the biggest change to the PC platform since the launch of the Pentium processor and considers the implications of these extensive upgrades and modifications.



**Mother knows best:** Intel's D925XCVLK motherboard showcases the i925X chipset.

## Where does 64-bit fit in?

One of the hottest topics on PC enthusiasts' lips at the moment is that of 64-bit computing. AMD is doing well with its 64-bit platform, despite the fact that there's no OS for it yet. Intel has already mentioned that it will launch a 64-bit processor as part of its Xeon workstation line later this year, but APC has heard rumours that the i915G/i925X chipsets support 64-bit extensions and are ready for a 64-bit-compatible Pentium 4 processor. When APC contacted Intel Australia, the company denied this.

Although Intel and AMD tend to save their thunder for significant processor launches, Intel has released a string of dramatic changes on the desktop. The introduction of the company's i915G and i925X chipsets represent the biggest release since the launch of the 60MHz and 66MHz Pentium processors in 1993.

Codenamed Grantsdale, the i915P/G picks up from the i865 chipset and is pitched towards the mainstream market, while the i925X (Alderwood) version replaces the i875 as the performance solution.

The i925X maintains its premium branding by including an enhanced memory pipeline, and both chipsets share the ICH6R south bridge. The list of upgrades and modifications between iterations is massive. These changes include the introduction of a number of key technologies:

- Socket 775
- PCI Express
- DDR2 memory
- Intel High Definition Audio
- Intel Matrix Storage Technology
- Intel Wireless Connect Technology
- An updated graphics engine
- ATX Rev2.2 power supplies

APC has pulled a quantity of next-generation hardware into the lab for testing. The list includes Intel's D925XCVLK i925X-based and D915GUX i915-based reference motherboards and two retail units: an i915-based Albatron PX915G Pro, and ASUS's i925X-based P5AD2. CPUs from ASUS and Intel, DDR2 memory from Corsair, Kingston and Micron, and an Abit PCI Express-based Radeon X600 XT graphics adaptor were also tested in

order to provide a complete roundup of the chipset and motherboard features.

## SOCKET 775

Socket 775 offers a substantial redesign of the existing ZIF-style socket that has been around for a decade. Intel has also launched a number of new processors to take advantage of the new CPU interface. The first one is quite a mouthful: "Pentium 4 Processor Extreme Edition supporting Hyper-Threading Technology at 3.4GHz," commonly known as the 3.4GHz P4EE.

The others are simply dubbed "Pentium 4 Processor 550 and 560", equating to 3.4 and 3.6GHz Pentium 4 processors respectively. The Socket 775-based processors will shortly be followed by a 3.8GHz version, to be sold as the Pentium 4 Processor 570. A 4GHz model is also slated, and will bear the Pentium 4 Processor 580 tag.

As the Socket 775 interface is slated to stay for a couple of years yet, Intel is also moving its budget line across to fit the new motherboards. Along with the new Pentium 4s, the company launched a fresh line of Socket 775-based 90nm Celeron D processors, which fit into the 3xx group under Intel's CPU nomenclature.

The most significant change to the interface between motherboard and CPU is that the processors no longer sport pins. Grantsdale and Alderwood motherboards feature a bank of pins on the surface of the CPU socket, which means the end of bent processors. Unfortunately, moving the fragile element of a CPU onto the motherboard doesn't eliminate the potential for end users to damage processors during installation.

Motherboard manufacturers are reportedly refusing to honour warranties on motherboards beyond 20 CPU insertions, but this will be extremely difficult to police. Take a look at the PCI Express introduction video on this month's cover CD set for a close look at the CPU interface and new copper-coated heatsink assembly.

## PCI EXPRESS

Hands down, the biggest change to come with the launch of 9xx chipsets is the introduction of PCI Express for bus communication.

While PCI uses parallel connections to control peripheral hardware, PCI Express moves data in serial. This means that each PCI Express channel gets the full bandwidth of the interface, unlike PCI which shares the total bandwidth between every component on the bus. PCI only has 133MB/s of total bandwidth across the entire bus, but this is raised to 500MB/s per channel under PCI Express.

As an added bonus, these channels can be

## In the green corner

With Intel's massive changes to the desktop, you can bet that AMD is sitting on the sideline, taking note. AMD is seeing strong growth in the 64-bit arena but can't afford to relax and let Intel get traction again on the desktop with a bevy of chipset features. AMD is preparing to launch PCI Express solutions later this year but the recent move to Socket 939

for both Athlon 64 and FX platforms means that the company is committed to using low-cost DDR memory for a while. Whether or not it can counter impressive Intel features such as Matrix Storage Technology remains to be seen, but AMD's 64-bit dominance will maintain its positioning as a hardware engineering company for serious power users.





combined to provide even more bandwidth. First-generation motherboards are shipping with two types of PCI Express slot: x1 (single channel) and x16 (eight channel). The single x16 connector, which sits in place of the 8x AGP slot found on most Socket 478 motherboards, is designed to handle video. This could theoretically grow on future boards, but there's little reason for users to fit several high-end graphics cards to a PC at once.

The other type of PCI Express slot can be found nestled between PCI slots on Grantsdale and Alderwood boards. The x1 interface is designed to support components like RAID controllers, modems and Ethernet adaptors that don't require the enormous bandwidth offered by the x16 version. The current i915G/925X spec provides support for up to four x1 slots and six PCI interfaces.

The i915G and 925X chipsets include support for eight USB 2.0 ports, four Serial ATA hard drives and four PCI Express x1 lanes. Intel hasn't integrated a FireWire port into the south bridge, but the D925XCVLK reference board featured one, supplied by an Agere chipset. Gigabit Ethernet is now standard. Thankfully, there's no plan to drop parallel ATA support in the short term, as current-generation optical drives still rely on the older interface.

#### DEATH TO AGP

Expect most boards to ship with a combination of PCI Express and PCI slots for a while, but the introduction of PCI Express means the death of the AGP port — at least boards built on Intel's chipsets. AGP was initially designed to act as a stopgap when video cards began pushing the limits of the shared PCI bus.

As video performance kept growing, the AGP standards came thick and fast, leading to the development of AGP 2x, then 4x and finally 8x slots in 2002. Current top-flight cards like ATI's Radeon X800 XT and Nvidia's GeForce 6800 are starting to push up against the limited headroom offered by the 8x AGP interface, necessitating the move to x16 PCI Express. This interface provides 4GB/s of bandwidth in each direction, providing a total of 8GB/s bandwidth. There's theoretically nothing stopping future designs from combining more PCI Express channels to create an x32 slot, either.

#### DDR2 MEMORY

Another change with the advent of the new chipsets is the introduction of 533MHz DDR2 memory. Although it runs at a lower internal clock speed, DDR2 has twice the prefetch capacity of DDR memory, meaning that it can move double the quantity of data per clock. While latencies are up on early implementations, Intel has hinted that it intends to ramp DDR2 speeds up quickly, reaching 800MHz by the end of 2004.

While both Intel's i915G and 925X reference

motherboards feature DDR2 slots, the lower-spec chipset also maintains support for DDR memory. The first i915-based retail board through APC's labs (from Albatron) employs standard PC3200 DDR SDRAM. Several motherboard manufacturers have hinted that they will maintain DDR support on their first-generation i915G boards in order to ease the cost of transitioning to the new platform. This is a wise choice, as early indications are that DDR2 is going to retail for about double the cost of regular DDR. A number of manufacturers have DDR2 RAM on the market, and we've been able to test Corsair, Kingston and Micron modules thus far.

#### INTEL MATRIX STORAGE TECHNOLOGY

Intel has also recognised the tendency for power users to run RAID arrays on their hard disk systems and has made provisions within the ICH6R south bridge. Intel's Matrix Storage Technology (MST) provides improved RAID support over the limited implementations found in i865/875 boards.

RAID 0 and 1 configurations are now supported at the hardware level and, even better, across partitions. This allows users to create a fast disk and a mirrored disk using RAID arrays without having to shell out for four physical hard drives.

Imagine you have two 120GB drives that you partition in half, so you end up with four 60GB partitions. MST enables you to combine the opening partitions on each drive into a single 120GB RAID 0 (striped) array, and then run a 60GB RAID 1 (mirrored) array using the remaining two partitions. This gives the ultimate blend of performance and data redundancy at a low price, and will be very popular with performance-hungry end users and box builders alike.

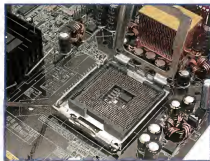
#### ATX REV2.2 (24-PIN) PSUS

The Grantsdale and Alderwood motherboards tested here all rely on ATX Revision 2.2 power supplies, which feature 24-pins (compared to the 20-pin plugs found on current desktop ATX designs). The 24-pin power supplies have been used in the server arena for a while, but this is the first time they've filtered down to desktops. They offer extra power management features and are also sold as EPS12V PSUs. More information on the ATX 2.2 spec can be found at [www.formfactors.org/developer/specs/atx2.2.pdf](http://www.formfactors.org/developer/specs/atx2.2.pdf).

#### ONBOARD GRAPHICS

Intel's Extreme Graphics turned out to be a poorly chosen moniker for the company's first foray into integrating support for 3D applications onto the motherboard. The benchmark results offered by i845G-based boards were far from extreme, and even the most patient 3D gamer complained of the lacklustre performance.

Intel has addressed this issue with the release of the i9xx chipsets and although the Extreme ►



**Pin cushion:** Intel's new LGA775 socket features pins.



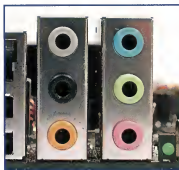
**Express lane:** PCI Express slots are available in two flavours — x16 (red) and x1 (blue).



**Slow poke:** DDR2 RAM currently offers no performance gain over DDR despite a price premium.



**Power struggle:** the i9xx chipsets bring 24-pin ATX connectors to the desktop.



**Got you surrounded:** i9xx chipsets feature 8-channel audio support.

## Goodbye Socket 478. . .

So, you've just purchased a new Pentium 4 processor and are now panicking that you've blown several hundred dollars for nothing. Fear not — boards built on Intel's ageing i845 chipset are still available, so there's no reason to think that the pool of i865 and i875-based motherboards will evaporate overnight. SiS and VIA plan on maintaining support for Socket 478, and the existing supply of chipsets will see out demand until at least the end of the year.

## It's in the numbers

Intel's next-gen platform provides a slight performance boost during benchmarking, but isn't taking full advantage of the new architecture yet.

The benchmarks show a marked performance increase when using the premium i925X chipset over the i915G, even when not relying on the latter to provide video support. But the biggest surprise came in the performance of the reference boards relative to the implementations from ASUS and Albatron. The latter even managed to pip the performance offered by Intel's own designs, managing 25.4 under Business Winstone 2004 against the D915GX's 24.5.

► tag has been dropped, the current Grantsdale and Alderwood boards are capable of handling lightweight 3D graphics. Intel's Graphics Media Accelerator 900 provided benchmark scores of around 5,113 under 3DMark2001 when tested with a 3.6GHz Pentium 4 processor and 1GB of 533MHz DDR2 memory. The new adaptor also provides support for DirectX9 and Pixel Shader 2.0, although a score of 1,445 under 3DMark2003 indicates that the system isn't setting any speed records in current-generation games.

While Intel's i915G reference board features a VGA port, it also ships with an x16 PCI Express riser card that pushes the onboard graphics through a DVI interface. An i915G-based board from Albatron (reviewed opposite) only features an onboard VGA port, though.

Motherboard manufacturers will be free to come up with their own implementations, but APC expects more and more boards to ship with the PCI Express x16 risers as the DVI interface starts to take over from VGA. The new graphics adaptor also provides support for HDTV displays.

### DIGITAL HOME

CPU speed isn't enough to sell a processor any more. Current desktops are fast enough to handle most tasks, including video editing, so Intel is looking at what value-adds can be bundled with basic PC building blocks. Integration of common components such as audio and video with the motherboard has helped lower the total cost of ownership for basic PCs, but the list of onboard functions grows with every platform release.

Intel is pitching its current platforms towards the digital home and is really playing up video,

audio and networking performance when marketing its new line of motherboard chipsets. As CPUs and motherboards — once the realm of the hardcore geek — become mainstream electronics components, chipmakers must reposition themselves as consumer electronics providers. This means dropping the blind quest for speed and instead talking about things like wireless connectivity and the "digital home".

Intel's Wireless Connect Technology will enable an Alderwood- or Grantsdale-equipped PC to act as a wireless access point when a Wi-Fi-compatible south bridge, the ICH6W, is released. Although this functionality won't be available from launch, Intel will offer Wi-Fi connectivity towards the end of 2004.

A proprietary PCI adaptor will provide support for 802.11b/g protocols. The 802.11g standard provides a theoretical bandwidth of 54MB/s and is fast enough to stream media or serve data in a home or small business environment. Intel acknowledges that the 802.11a protocol only has a foothold in the enterprise and is wise not to include support on its desktop boards.

Although many motherboard manufacturers have included wireless access points with their top-end boards for a while, this push from Intel will help accelerate the uptake of home wireless networking. Intel is trying to position itself as a platform provider and the inclusion of wireless networking on Intel's premium boards is a key part of Intel's digital home push. It's a blow for the company to not be able to launch Alderwood and Grantsdale with their full feature sets, but you can bet Intel will be pushing wireless this Christmas.

### INTEL HIGH DEFINITION AUDIO

As part of the digital home push, Intel has also massively boosted the audio support in its i9xx chipsets. Intel's High Definition Audio features 192KHz, 24-bit/7.1 audio support under Dolby Digital EX, THX Ultra2 and DTS ES.

Provided manufacturers are able to keep the signal-to-noise ratio down on motherboards, this release could provide plenty of competition to high-end soundcard manufacturers, who have long been able to rely on the superior audio quality offered by their products to generate sales. VoIP and voice recognition also get a mention in Intel's launch notes, and the company offers support for complex microphone arrays.

### NOW WHAT?

While these are all impressive changes which have been due to the PC platform for a while, will they make any difference to system performance? The proof is in the benchmarking.

In this case, the reason is clear: the first iteration of DDR2 memory used on the Intel reference design doesn't match the performance of tried-and-tested DDR, despite the fact that it's running at a lower clock speed. DDR2 suffers from high internal latencies and though it moves double the data per clock, it's out-performed by current DDR.

Intel will be aggressively ramping up the performance of DDR2 throughout 2004, so don't expect this to remain the case for long.

Overall, the extra chipset features and acceptable benchmark scores show that the future of the x86 platform is looking bright.

# Power to the people

Matthew Overington puts two of the first motherboards to market based on Intel's 9xx chipsets through their paces.

## Albatron PX915G Pro

The first Socket 775-equipped motherboard to make it to APC for testing comes from Albatron. The PX915G Pro is based on Intel's consumer chipset and employs standard DDR memory. Several other motherboard vendors are following this trend for entry-level boards, as it helps keep the cost down for early adopters. DDR2 memory is slated to be expensive for a while, so this reduces the price of transitioning to the new platform.

Even with the DDR memory running at 400MHz, the Albatron scores higher in benchmarking than the Intel reference board which runs DDR2 at 533MHz. This shows that there's absolutely no performance benefit associated with switching to DDR2 at the moment.

The Albatron unit is based on the 915G chipset and features Intel's Graphics Media Accelerator

900. The onboard adaptor performs adequately under the ageing 3DMark2001 benchmark, but only manages 1,445 under 3DMark2003.

The PX915G Pro is fitted with all the spoils of the 915G chipset, including support for eight USB 2.0 ports, three IDE adaptors (including two in a RAID array), four Serial ATA adaptors, dual Ethernet (including one Gigabit port) and 7.1-channel audio. Two x1 PCI Express slots are present, along with a single x16 slot. In fact, the only thing missing from this board is a FireWire adaptor.

The board remains stable and quick during testing, beating Intel's D915GUX motherboard in every test. Although the 915G chipset doesn't offer the performance of the 925X, the platform is off to a great start.



### Details

Contact	Australia IT
Phone	1300 668 715
Online	www.australiat.com.au
Price	TBA
✓	Faster than Intel's reference design.
✗	No FireWire support.
Verdict	●●●●○

## ASUS P5AD2

ASUS' premium P5AD2 board is built on the i925X chipset and employs 533MHz DDR2 memory, as does Intel's D925XCVLK reference board.

The board is replete with just about every appointment a power user could ever want, including eight Serial ATA ports, IDE RAID, FireWire A and B, and Gigabit Ethernet ports. Full 7.1-channel audio is supported, along with coaxial and SPDIF outputs.

As a premium board, the P5AD2 also features a built-in 802.11b/g wireless adaptor and software to enable the board to act as an access point. ASUS has offered wireless access on its top-shelf motherboards for a while, and is beating Intel to the punch with its 'digital home' concept.

Like other i9xx-based units, the ASUS model relies on a 24-pin ATX 2.2 power supply. These

power supplies are expensive, but are extremely stable. Under benchmark testing, the i925X-based ASUS unit scores on a par with the reference board.

This is expected, as the ASUS and Intel boards both run on the same Corsair XMS-2 533MHz DDR2 memory, negating the performance boost shown by the Albatron's reliance on regular 400MHz DDR.

Although it supports onboard video, the ASUS unit doesn't ship with a PCI Express riser, so buyers will have to factor in the cost of a new 3D adaptor, too. Given that buyers will have to purchase a new processor, power supply, motherboard and memory to jump on board the new platform, this is a very minor cross against ASUS.



### Details

Contact	Achieva Technology
Phone	(02) 9742 3288
Online	www.achievea.com.au
Price	TBA
✓	Packed with features.
✗	No video riser.
Verdict	●●●●○

### Business Winstone 2004

Intel D925XCVLK (Radeon X600 XT)	0	26	30
ASUS P5AD2 (Radeon X600 XT)	0	25.8	30
Intel D915GUX (on-board video)	0	24.5	30
Albatron PX915G Pro (on-board video)	0	25.4	30

### 3DMark 2003

Intel D925XCVLK (Radeon X600 XT)	0	4,241	5,000
ASUS P5AD2 (Radeon X600 XT)	0	4,496	5,000
Intel D915GUX (on-board video)	0	1,388	5,000
Albatron PX915G Pro (on-board video)	0	1,445	5,000

# DVD doubles up

Now that they've finally arrived on the commercial market, Nick Race takes two of the latest Double Layer DVD burners from Sony and BenQ for a test drive.

DVD burning has come a long way in a short time. Ever since Pioneer announced the first DVD-R drive, a monstrous SCSI-2 single speed unit in October 1997, recording speeds have been increasing in stops and starts. Not including DVD-RAM's 2.4x and 3x progression, DVD+R and DVD-R drives have gone from 1x slowpokes to 2x, 4x and 8x in less than five years.

Today, manufacturers are poised at the next major jump in DVD writing technology, and drives due for release later this year will burn at 16x. But raw performance isn't everything. Along with the faster drive speeds, another change is on the way: Double Layer burning.

## FITTING IT ALL IN

The DVD+R Double Layer (DL) standard is championed by the DVD+RW Alliance ([www.dvdrw.com](http://www.dvdrw.com)). The technology behind it is essentially a refinement of the drive's engineering, enabling the red laser to focus on two different depths within the disc.

This means that the drive can write to two separate dye layers on the DVD media, effectively doubling disc capacity. This technology has been around for several years on commercially manufactured DVDs, but it's only now that Double Layer burning is available to mainstream Australian consumers.

The double density floppy evolved into high-density disks, and even CD-R capacity has increased from 650MB to 800MB. DVD writing for the home market has been limited to recording to single layer (4.7GB) discs, but the new influx of Double Layer drives bumps this capacity up to 8.5GB.

Single layer CD media is manufactured to contain a single layer of dye with a reflective layer underneath it. This is then



*Twice as nice: the storage capacity of Double Layer media opens up a world of possibilities for home users.*

enclosed in a polycarbonate resin with UV-resistant properties for protection. Double Layer media has another semi-transparent reflective layer and coating of dye on top of the standard dye layer. The second semi-transparent layer is manufactured to a fine tolerance, allowing a laser of the right intensity and focal length to shine through it and affect the dye layer below.

## GENERATION GAP

The incredibly fine process of manufacturing DL discs is yet to be perfected and current yields of the media are quite low. Unfortunately, this has a carry-over effect to those interested in buying and using the DVD+R DL technology.

With current estimates for DL media at approximately \$13 to \$15 per disc, the price per gigabyte is steep compared with single layer media. As with all innovations, once the process is perfected and greater quantities manufactured, the price will drop.

The first generation drives support DL writing at 2.4x, meaning it takes roughly 45 minutes to completely fill a disc. As the technology matures, expect to see increases in speeds along the same lines as single layer recorders. With 4x DL drives shortly coming into production, there won't be long to wait.

Due to the minimal number of changes in the drives and the low cost of upgrading current fabrication plants to produce them, plenty of Double Layer compatible drives are about to hit the market. Double Layer drives will remain a premium product for the time being, however, with vendors continuing to offer single layer drives at a lower price point.

## DL pending

The only standard for Double Layer disc technology is currently DVD+R DL, supported by the DVD+RW Alliance ([www.dvdrw.com](http://www.dvdrw.com)). An up-to-date list of drives that support DVD+R DL is available on its Web site.

With drives pending from AccessTek, AOpen, Lite-On, NEC and Philips as well as the Sony and BenQ burners reviewed here, there will soon be an abundance of choice.

There's no competing DVD-R DL specification from the DVD Forum as yet, but we'll let you know as soon as news comes to hand.

## How we tested

Reading and writing capabilities were tested using Nero's CD-DVD Speed application. The program is bundled in with the Nero 6 Suite, and reports comprehensive information on drive performance. CD-DVD Speed writes random data to the disc in various file sizes, then runs a suite of tests on the

disc, including transfer speed, CPU usage at different speeds, as well as spin up and spin down times. This effectively tests the drive in situations similar to real world applications.

Reading and writing tests were run using 4.7GB single layer DVDs, 8.5GB Double Layer discs and 750MB CDs.



## Sony DRU-700A

Ever the innovators, Sony was the first company to market a Double Layer recordable DVD drive in Australia. Early adopters will be pleased to note that the DRU-700A still burns to single layer media.

The drive supports DVD±R at 8x, DVD±RW at 4x as well as CD-R at 40x, but writing to DVD+R DL is limited to 2.4x.

The drive's Double Layer capabilities show mixed results. An entire DL disc writes in 45 minutes and 10 seconds (including lead-in time) at a consistent 2.36x over the length of the disc. The burned DL disc reads at an average speed of 4.29x, significantly slower than the rated speed of 12x.

All PC DVD-ROM drives in the APC Labs could read the DL test disc. However, some older DVD drives may require a firmware upgrade before they can recognise DVD+R DL discs.

In single layer write tests, an 8x DVD+R completes in nine minutes and 18 seconds, equating to 7.17x over the length of the disc. Reading back the 4.7GB disc averages 6.15x over the length of the disc.

The DRU-700A supports CD-R writing at 40x and CD-RW at 24x. It achieves read speeds of 31.5x in two minutes and 40 seconds, while writing a CD

to capacity takes three minutes and two seconds at an average of 31.68x over the length of the disc.

The drive also supports the emerging DVD+VR writing method, enabling it to record video to a disc in multiple sessions, record from a TV capture device directly to disc, or add and change content in a home movie after a disc is written.

Software support for DL writing is limited at this time. Thankfully, the DRU-700A includes a comprehensive software package. InCD 4, Burning ROM 6 SE, Vision Express 2, BackItUp and Showtime take care of burning, packet writing from within Windows Explorer, data backup, DVD playback and digital video editing. Bundled with only a single blank DVD+R DL disc, the DRU-700A it's not as useful out of the box as hoped.

For a first offering, the Sony DRU-700A is an excellent product. With top end support for DVD-R and DVD+R, as well as new Double Layer technology to increase DVD capacity at a lower speed, the DRU-700A is sure to please anyone looking for a top-notch, future-proof drive.



**Driving forward:** Sony's DRU-700A is cutting-edge technology.



### Details

Contact Sony Australia

Phone 1300 138 246

Online www.sony.com.au

Price \$349



DVD+VR support; excellent software package.



Slow SL and DL read speeds.

Verdict



## BenQ DW1600

The BenQ DW1600 takes speed to the next level, supporting DVD+R writing at a whopping 16x and DL writing at the current generation standard 2.4x. DVD+RW is supported at 4x, and DVD-ROM reading at 16x. However, the model tested here is an engineering sample and may differ slightly from the production version.

As it stands, the DW1600 doesn't provide support for DVD-R media. However, a firmware upgrade due this month will enable support for DVD-R and DVD-RW recording.

In testing, the DW1600 writes an entire single layer DVD+R in six minutes and seven seconds (including lead time), at an average of 11.24x over the length of the disc.

The drive can read the 16x disc at an average of 6.25x, and completes the operation in nine minutes and 35 seconds. Not outstanding, but still slightly faster than the Sony DRU-700A. It writes an 8x DVD in eight minutes and 42 seconds, at 7.64x over the length of the disc.

Of course, Double Layer writing capability is the jewel in this drive's crown. Offering almost identical results to Sony's DRU-700A, the BenQ writes a complete DL disc in 44 minutes and 51 seconds, or 2.39x.



It reads the DL disc back in 17 minutes and 56 seconds at a solid 6.03x over the length of the disc, showing less of a disparity between read performance of single and Double Layer discs than the Sony drive.

CD test results are somewhat disappointing. The drive is currently limited to CD-R burning at a maximum of 16x, taking five minutes and 37 seconds to complete the test disc. It reads the same disc in two minutes and 39 seconds, at an average of 31.54x over the length of the disc. BenQ states that the DW1600 will be released with 40x burning for both CD-R and CD-RW.

Bundled with the drive is BenQ BookType Management Software, which enables the identifier for DVD+R/W discs to be changed to DVD-ROM — a useful workaround for drives which don't recognise DL discs. At time of writing, BenQ's representatives indicated that either Sonic's RecordNow or Nero Express 6 would also ship alongside WinDVD and WinDVD Creator. While it's not as comprehensive as Sony's package, this suite covers all the drive's functions.



**Speed demon:** 16x DVD+R writing is the fastest seen so far.



### Details

Contact BenQ Australia

Phone (02) 9714 6800

Online www.benq.com.au

Price \$329



Ultra-fast DVD writing.



Slow CD-R burning.

Verdict



## AMD Socket 939 Athlon 64 FX-53 CPU

The Athlon 64 FX-53 processor has switched sockets, but Microsoft is still unable to release a compatible OS.



Switching sockets: the new platform for AMD 64-bit processors lowers the bar for mainstream adoption.

### Windows XP 64 Beta

Microsoft has made a beta of Windows XP for 64-bit Extended Systems available under the Customer Preview Program. It's available by download and on CD from [www.microsoft.com/windowsxp/64bit/default.asp](http://www.microsoft.com/windowsxp/64bit/default.asp).



### Details

Contact	AMD
Phone	(02) 8877 7222
Online	<a href="http://www.amd.com.sg/au">www.amd.com.sg/au</a>
Price	US\$799 (in lots of 1,000)
✓	Excellent performance; uses unbuffered memory.
✗	No Windows operating system.
Verdict	●●●●○

### Benchmarks

#### SPC CPU2000 SPECint integer test

Athlon 64 FX-53 (v2)	1,568	2,000
Athlon 64 FX-53	1,516	
Athlon 64 FX-51	1,428	

#### SPC CPU2000 SPECfp floating point test

Athlon 64 FX-53 (v2)	1,616	2,000
Athlon 64 FX-53	1,598	
Athlon 64 FX-51	1,344	

Benchmarks under Windows XP for 64-bit Extended Systems.

With the introduction of Socket 939, AMD's new desktop CPU interface, the FX-53 has been given a revamp. Though it shares its name with the

Socket 940 model, the new Athlon FX-53 has a few important changes over the older chip.

AMD has enjoyed outstanding success in the server market with its Opteron line of processors, outselling the Intel Itanium within nine months of release. The Opteron now has support from three of the four major server vendors — HP, IBM and Sun Microsystems. This bodes well for the Athlon 64, with AMD hoping to continue the trend into the 64-bit desktop market.

### SOCKET CHANGE

The move to Socket 939 means that all desktop Athlon 64 processors employ the same interface. This is a boon for consumers, as it helps drive down the cost of building a 64-bit desktop machine. While 940-based boards require registered DDR modules to operate, 939-based motherboards can use unbuffered, run-of-the-mill DDR which is cheaper and quicker than the buffered type.

Registered ECC RAM is ideal in the server and workstation market thanks to its ability to detect and correct some errors in memory, leading to increased stability and accuracy. However, all this extra checking isn't required for most desktop computers, and the removal of the extra layer of complexity helps reduce RAM access times.

While registered ECC RAM extends to PC3200 (400MHz DDR) speeds, unbuffered RAM can be purchased at up to PC4400 (550MHz DDR) spec. This is excellent news for overclockers. And in dollar terms, registered ECC RAM is approximately one-third more expensive than regular DDR.

The second major change to the FX-53 is an upgrading of the Athlon 64's HyperTransport support. HyperTransport is a communications bus,

enabling ultra-fast data transfers between I/O devices in a PC. With the FX-53's support for HyperTransport transfers at 2GHz, the CPU has an effective I/O bandwidth of 8GB/s, more than adequate for data-heavy graphics, sound or gaming.

But the reality isn't as impressive as the numbers suggest; the processor rarely

needs to deal with data at that rate. However, next-generation Socket 939 boards are expected to include support for PCI Express, furthering the need for wide data channels.

### THE BIG BUT

Though the Athlon 64 FX-53 in its current incarnation is an excellent processor, the lack of a compatible 64-bit Windows OS is hampering adoption of the FX-53 and Athlon 64 processors. There's currently support for AMD 64-bit systems in the form of SuSe and Mandrake Linux as well as Net850 OS, but these aren't mainstream players.

While it's fine for a dedicated geek to compile their own Linux kernel to take advantage of 64-bit architecture, it's mainstream acceptance that will drive software development. Shannon Rudd, head of PR at Microsoft Australia, wouldn't commit to a firm release date, saying only that the company will release Windows XP for 64-bit Extended Systems in "the second half of this year".

The upside is that AMD 64-bit systems run well under Windows XP or 2003 Server, and are being sold as premium processors for the 32-bit platform. Performance under 32-bit applications is almost on par with Athlon XP processors, and buyers will get another speed boost when the 64-bit operating system is finalised.

### TOE TO TOE

To put the new unit in perspective, the Socket 939 FX-53 processor was put head-to-head against the Socket 940 iteration and the first release FX-51. The test system was comprised of an MSI 9702E motherboard, 1GB of Corsair TwinX PC3200 RAM, an ATI Radeon 9800 Pro and Seagate Barracuda 7200.7 200GB hard disk drive.

The FX-53 manages to score 1,568 points in the CPU2000 SPECint integer test, beating the first generation FX-53 by just over 3%. This is within the performance boost expected after the switch to unbuffered RAM. The CPU outperforms the first generation FX-51 processor by almost 10%, a substantial jump between releases.

In the CPU2000 SPECfp Floating Point Test, the FX-53 edges out the Socket 940 version by just over 1%. But the FX-53 has advanced leaps and bounds over the FX-51, managing to increase performance by 20% over the older CPU.

The narrow difference in benchmark scores between the Socket 940 and Socket 939 CPU is largely attributable to the switch to unbuffered memory. However, the tweaked HyperTransport bus will play a role in more extensive benchmark testing when Microsoft releases a 64-bit OS.

Nick Rice

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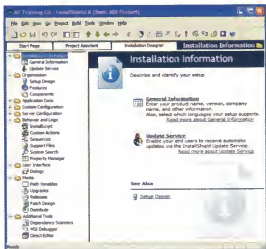


MOBILE  
TECHNOLOGY



# InstallShield X deployment tool

InstallShield makes managing and deploying software a snap, even if you're not a programmer.



**The hub:** the InstallShield X IDE offers a simple tree view giving instant access to any part of the setup project.

## Alternatives

For a cheaper Windows-only installer, try WinINSTALL at [www.ondemandsoftware.com](http://www.ondemandsoftware.com).

For a free MSI-repackager try MaSAL Editor and MaSAL Repackager from [www.masaleditor.com](http://www.masaleditor.com).

For those who really take their software deployment seriously, check the news and hints and tips at [www.appdeploy.com](http://www.appdeploy.com).

## Details

Contact	MicroWay
Phone	1300 553 313
Online	<a href="http://www.microway.com.au">www.microway.com.au</a>

Price	\$3,195 (Premier), \$1,920 (Professional)
-------	---

✓	Complete deployment solution; targets Windows, Mac, Linux and Web.
---	--

✗	Hefty price; buggy without patching.
---	--------------------------------------

Verdict	●●●○○
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Once, installing an application was as simple as copying it from a disk or across a network from one directory to another. Under Windows, it's a little more complicated.

Programs such as InstallShield are designed so developers can bundle compiled applications into easy-to-use packages for mainstream distribution. But InstallShield can do much more — it's extremely handy for automating bulk file copies and system changes, too.

Suppose you've just finished a slideshow of a

recent holiday and you want to share it with friends and family who aren't computer-savvy. InstallShield enables you to bundle an image viewer, a set of pictures and a script to run the slideshow into a single executable package. This way, the recipient only needs to double-click on an installation program. Files are then copied to a user-configurable location on the hard disk, while desktop icons and menu shortcuts are added.

Another possible use for InstallShield is setting up multiplayer gaming. Many first-person shooter games require custom patching before they can be played online, but loading multiple patches one at a time is tedious. Using InstallShield, it's possible to bundle a custom set of game libraries, maps and patches into a single installation file, so gamers need no more than double-click on setup.exe to synchronise settings with friends.

Businesses can use this same approach to package and distribute training CDs, licensed productivity apps or commonly-used software.

## SETUP ON STEROIDS

Every InstallShield project works much the same way: fill out some basic information (program name, version and company name), then configure the "Full install" and "Custom install" set of options. These are known as features and can be tweaked and changed at any time, so any bad design or mistakes won't cause problems with the rest of the project.

The third step is to add all the files to be deployed. These can be dragged-and-dropped into the project by grouping related files into "components" which then serve as the fundamental building blocks of the setup. InstallShield is full of powerful options to make projects completely flexible, allowing you to choose the location for the installation, the language to be used and many more options. Facilities exist to add custom banners and an auto uninstaller, and even to offer online updates.

To complete the project, the target media (floppy, Web, CD, DVD etc) must be specified and the Build button pushed. InstallShield packs and compresses files, outputting disk images and the setup.exe file at the end.

## WHAT'S IN THE BOX?

InstallShield X is, in many ways, a convergence of previous product lines, including DevStudio, MultiPlatform and UpdateService. It's designed to create cross-platform installers for PCs, databases, Web services and mobile devices.

InstallShield X is available in two flavours: Professional and Premier. The core functionality is the same, but Premier adds AIX and OS/400 support, interactive CD browser creation, XML file updating for universal installers and several other features. InstallShield Express 5, a basic, Windows-only version, is also available for \$560. A detailed list of the differences between versions can be found at [www.microway.com.au/installshield/comparison.stm](http://www.microway.com.au/installshield/comparison.stm).

Where InstallShield X excels is in the sheer richness of facilities it offers. It probes Visual Basic executables to eke out every DLL the program depends on, and then adds these to the project, too. It can build a Windows MSI image, or make a setup for Linux, Mac OS, AS/400 and a variety of other OSes. These don't need to be built on the target machine; everything can happen straight from within the Windows IDE. A custom scripting language gives full control of the installation process, but this can easily be ignored in favour of the very straightforward point-and-click interface. For Web deployment, code can even be added to scan your computer so only necessary files are downloaded to save time and bandwidth.

There are a couple of complaints, though: out of the box, InstallShield X crashes with alarming regularity. A patch is available to address this issue, which is just as well because online support is also lacklustre.

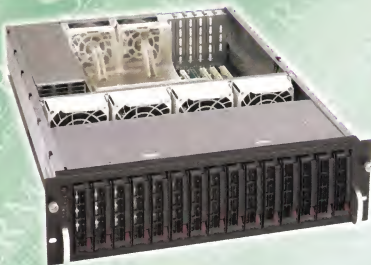
InstallShield X is a mighty tool in the power user's arsenal. It's just a shame it's so expensive.

David Williams



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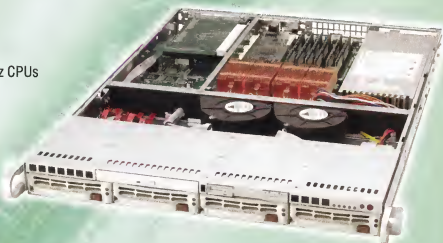


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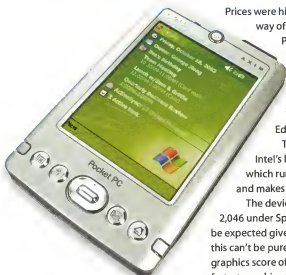
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## Dell AXIM X30 handheld

Dell has launched its most potent weapon in the battle for PDA supremacy with a powerful addition to the AXIM line.



**Speed demon:** the X30 is the fastest PDA currently available.

Prices were high and there was little in the way of competition when the Pocket PC market was first forged. It took an influx of established IT players joining the market to bring prices down. Dell's AXIM X30, running Microsoft's Windows Mobile 2003 Second Edition, continues that tradition. This is the first Pocket PC with Intel's latest mobile CPU, the PXA270, which runs at a clock speed of 624MHz and makes the X30 today's fastest PDA.

The device notches up an overall score of 2,046 under Spb Software's benchmark tool, to be expected given the high processor speed. But this can't be purely credited to the CPU — the graphics score of 5,314 shows that it also has the fastest graphics subsystem around. Comparing the benchmark results with the IPAQ h4000 series and ASUS MyPal 620, the X30 significantly outperforms them in almost every measure.

The PXA270 processor features SpeedStep technology and can run at a variety of speeds, from 100MHz all the way up to 624MHz. The processor's CPU stepping, as on Intel's notebook platform, is fully automatic and takes about 10ms to change speeds. It's also more power-efficient than the superseded PXA26X, as it automatically scales back processing when the system is idle.

### ON THE SMALL SCREEN

While PDA screens have been criticised in the past, the X30's display is crystal clear, faithfully reproducing colours during tests. However, the increments between brightness settings are wide, making them difficult to adjust accurately.

Despite operating system support for full 640 x 480 pixel VGA, the X30 runs at QVGA resolution (240 x 320 pixels). The review unit also had a solitary dead pixel just off the centre of the screen. It wasn't particularly noticeable unless the display was showing a dark background, but Dell's dead pixel policy only applies for two or more dead pixels.

One of the major enhancements in Windows Mobile 2003 Second Edition is support for both portrait and landscape screen layouts. Although the option to toggle screen orientations is buried several clicks away from the home screen, it can be assigned to one of the six hardware buttons to make the job easier.

### INS AND OUTS

The AXIM provides plenty of options for getting data in and out. Wireless networking (802.11b only) is activated with a hardware button, which is easier to work with than the software-based solutions most other manufacturers use. Windows Mobile 2003 Second Edition includes a connection wizard that makes joining a wireless LAN a snap, and the signal strength indicator in the task bar is a convenient touch.

Bluetooth implementation is equally easy to use. The AXIM runs the popular Widcomm stack, and it's simple to connect to mobile phones and other Bluetooth devices. As a Class 2 device, the X30 has a 10m range for Bluetooth, which is plenty for syncing just about any machine. A trial version of Griffin Remote is included, so the PDA can be used as a universal remote control for your TV, stereo and other home appliances.

Those who want to add peripherals will be pleased with the I/O capable Secure Digital slot for adding memory, cameras and GPS receivers. And if the built-in 64MB of system RAM isn't enough, an additional non-volatile storage area of just over 30MB is available. This can be especially handy for backing up important data using the supplied backup utility.

### ENOUGH FUEL IN THE TANK

The standard 950mAh Lithium-ion battery lasts for just over two hours running a looped MP3 with the screen at full brightness and both Wi-Fi and Bluetooth enabled.

In real world use, the battery lasts a full day. If you need more juice, an optional 1,800mAh extended battery pack — which delivers five hours of power in rundown tests — is available for \$26.40. On the downside, it's almost twice the size of the standard battery and adds about 5mm to the thickness of the unit.

The included cradle can accommodate both the PDA and a spare battery, charging them simultaneously. To get the most from the device, the Power Applet in the Control Panel allows you to select either High Performance or Maximum Battery Life, allowing the CPU to be scaled depending on whether you need more processor power or battery life. There's also an automatic mode that regulates the CPU's speed depending on its load.

If you have to have the latest and greatest, the Dell AXIM X30 is number one from a speed perspective. It's well connected and represents excellent value for money, although a screen supporting VGA would make it stunning.

**Anthony Caruana**

### palmOne Zire 31



Looking for an inexpensive colour handheld to look after email, contacts, appointments and MP3 playback?

PalmOne recently released the Zire 31 for

a low \$299. The device runs on PalmOS 5.2.8 and features a 160 x 160 pixel colour screen, 16MB of memory (14MB user-addressable), and an SD expansion slot. More information can be found online at [www.palmone.com/au](http://www.palmone.com/au).

### Details

Contact	Dell
Phone	1300 303 107
Online	<a href="http://www.dell.com.au">www.dell.com.au</a>
Price	\$649

✓	Connectivity: performance; storage space.
✗	Blocky design; QVGA only.
Verdict	●●●●○



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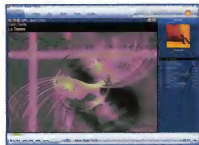
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## Microsoft Windows Media Player 10

The latest version of Microsoft's Windows Media Player is evolutionary rather than revolutionary.



Updates from Microsoft normally attract a lot of attention, especially when the product being upgraded is as integral to Windows as Media Player.

The version 10 installer is about 1.1MB larger than Media Player 9. While running, the memory footprint is almost identical — it starts off around 6MB and increases depending on the content loaded within the main window. This is extremely light compared with Apple iTunes' bulky 35MB base memory footprint.

At first glance, Media Player 10 is virtually the same as its predecessor in terms of features. All the standard options are present, including ripping, burning, synchronising, the Now Playing window, media library and online guide.

There is a new section, called Online Stores, which links closely to the Premium Services offered in version 9. This gives you the ability to subscribe to beat streaming audio and video services like Napster music and radio, MusicNow and CinemaNow. In Media Player 10 these have

been integrated into a "Digital Media Mall", whereby each service provides its own plug-in for download. This meshes with the Media Player interface, connecting users to the service as soon as Media Player starts up.

Media file support is the same as version 9, with one exception. Media Player 10 now natively supports DVR-MS files, which are recorded video and audio content stored on a Windows Media Center PC. At present, playback of these files requires XP SP1, the Q810243 Hotfix and a DVD decoder for XP.

One big improvement in Media Player 10 is the support for external media devices such as MP3 players, and the ease with which a user can set up an automatic synchronisation schedule between the machine and the portable device. By matching iTunes' user-friendliness, Microsoft is trying to win back the portable music lovers who flocked to the Apple camp.

Media Player 10 isn't going to revolutionise the computer media experience, although it's good news for portable MP3 addicts and those who make use of Media Center PCs. For the rest, it's really Media Player 9 with a funky blue skin.

**James Bannan**

### Details

Contact	Microsoft
Phone	13 20 58
Online	<a href="http://www.microsoft.com.au">www.microsoft.com.au</a>
Price	Free download
✓	Small memory footprint; DVR-MS support.
✗	No substantial improvements over version 9.
Verdict	●●●○

## Panasonic e.View 17in LCD monitor

Panasonic's new flat panel screen for the home and office is more suitable for work than play.



### Details

Contact	Panasonic
Phone	13 26 00
Online	<a href="http://www.panasonic.com.au">www.panasonic.com.au</a>
Price	\$960
✓	Clear display; fast response time.
✗	262,144 colour palette.
Verdict	●●●○

There's little argument that the LCD monitor market is hot right now. In fact, it's one of the biggest growth areas in IT and just about every screen manufacturer is looking to refresh its lines to take advantage of boosts in integrated circuit design and panel performance.

Panasonic's new e.View monitor is aimed at both home and corporate environments, but falls down in reproducing detailed images. The panel features a 16ms response time, but this is only for a 262,144 colour palette, not the full 16.7 million colour range offered by other manufacturers such as BenQ. Although the panel is quick enough for most gaming and DVD-watching situations, the limited colour range means that the displayed images lack detail.

The panel features a contrast ratio of 450:1, a brightness rating of 300cd/m<sup>2</sup> and a hardened glass coating across the front. The latter is designed to protect the fragile TFT panel from damage and to reduce glare. Unfortunately, the glass is also expensive and helps push the price of the 17in model up to \$960. A 15in version is also available for \$745.

The screen features a DVI connector and ships with both DVI and VGA cables, so connectivity isn't an issue. The one-touch automatic screen adjustment does a respectable job of configuring colour balance, brightness and clarity, and eliminating moiré effects (visual distortion). Two small speakers are fitted to the front bezel but they're really only suitable for system beeps and playing music at low volume.

In testing under the Nokia Monitor Test 1.0.0.1 application, the e.View is bright but unable to define distinct gradients in the greyscale at the extremes of the range (towards all-black or all-white, in other words). It excels in moiré tests, however, remaining clear at the screen's native resolution of 1,280 x 1,024 pixels.

Gamers and DVD buffs may find that the e.View doesn't quite suit their needs, but the sleek styling and limited colour output make this monitor well-suited to a corporate environment or office. The displayed image is clear and bright, the screen is backed by a three-year onsite warranty (metropolitan areas), and the inclusion of a DVI input helps future-proof the screen. This is handy, as the days of the VGA port are numbered.

**Matthew Overington**

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## Zone Labs ZoneAlarm 5 Pro/Security Suite



### Details

Contact	Secure Tec
Phone	(03) 9755 5314
Online	www.zonelabs.com.au
Price	ZoneAlarm Pro, \$99.95; ZoneAlarm Security Suite, \$155.46
	Comprehensive and detailed security; easy to learn and configure.
	Not a valid standalone enterprise solution.
Verdict	●●●●○

Zone Labs finally adds antivirus support to its leading online privacy and security suite.

Although most people know ZoneAlarm as a firewall application, enhancements to the commercial line should give current users cause to consider upgrading. ZoneAlarm 5 is now available in two versions, ZoneAlarm Pro and ZoneAlarm Security Suite.

All the features of previous releases are present, including MailSafe, Program Control (for setting control over network access) and event logging. Stellar new features include Fraud Protection and the ability to back up your security settings. Customised settings can be exported as XML files and loaded into an existing installation. All installations should have a unique password (or system-wide password for companies) to prevent accidental or malicious security modification.

ZoneAlarm Pro doesn't feature integrated antivirus, but does have virus monitoring that keeps an eye on third party antivirus programs and compares them with online versions. If there's a difference between what you have and what you need, it reminds you that updates are required.

This is a perfect solution for users who already have antivirus software installed.

ID Lock is a tool aimed at protecting personal data — including credit card details, access PINs, passwords and address details — by confining them in a secure "vault". Information in the vault can be protected from being sent over the Internet or by email, or blocked entirely.

ZoneAlarm Security Suite features all the components of the Pro version, plus IM security and Web filtering. IM security limits the type of content that can be sent to your PC via IM clients, including audio, video and standard files. It can also encrypt the traffic for added security.

Web filtering is another name for parental control. Sites are grouped into categories like "Adult: nudity" and "Pay to Surf Sites", and a checkbox determines whether these sites are blocked or not. Unfortunately, there's no detailed list of which sites these categories include and no information as to how often they are updated.

With each version offering something different, there's plenty of choice. Both expand on ZoneAlarm's solid pedigree, adding relevant features for today's paranoid market.

James Bannan

## Real Software REALbasic 5.5 application development tool



A full featured programming language that's simple to use?

Visual Basic could be facing some competition.



### Details

Contact	REAL software
Phone	(03) 9819 2891
Online	www.realbasic.com.au
Price	Standard, \$149; Professional, \$579
	Multi-platform; easy to use.
	Discourages good design; limited functionality.
Verdict	●●●●○

REALbasic is a modern programming language based on the well-established BASIC standard. It's simple to use without being trivial, offering support for XML, MS Office automation and, without changing a shred of code, works with Windows, Linux and Mac operating systems.

The Windows, Mac and Linux versions of REALbasic all work exactly the same way and create compiled programs that don't have any runtime dependencies.

The compiler builds in all the necessary smarts for a program to run on a particular platform, with the exception of Microsoft Office automation, which isn't available under Linux.

There are multiple similarities between REALbasic and Visual Basic. For example, both are event-driven rapid application development environments and use the dot-notation PME (properties, methods, events) approach.

There are also many differences — it produces one single file at the end of compilation, and it doesn't use or require any external DLLs or libraries.

While REALbasic can turn any computer user into a programmer within an hour, and create sophisticated pieces of software that embrace modern technology, it isn't a VB replacement. It does have constraints: third party ActiveX components can't be used, and REALbasic can't fill the role of a server-side CGI or scripting language, or as a service.

It leans towards beginners, as evidenced by the interface and design: if you copy and paste a control on a form, REALbasic duplicates the underlying code as well as the visual characteristics.

This is great for newbies looking to quickly develop an application, as you can make one button, then copy and paste it to create lots of buttons that do the same or similar things. It also contravenes elementary software design principles, where it's preferable to package repeated code into single subroutines.

Although it can be used to create reasonably powerful software, REALbasic is clearly a beginner-centric tool, a factor which may frustrate experienced developers.

David Williams

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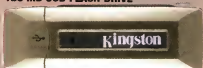
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## Epson PictureMate photo printer

With digital camera sales booming, the dedicated photo printer market is expanding.

Epson's newest contender impresses.



### Details

Contact	Epson Australia
Phone	1300 361 054
Online	www.epson.com.au
Price	\$399
✓	Convenient way to print 10 x 15cm digital photos.
✗	No battery backup.
Verdict	●●●●○

Most printers on the market today are spruiked as being able to print photos. While the performance of many desktop inkjet printers is acceptable, demanding users are looking for dedicated photo printers to provide clear, crisp images at home.

Epson's latest foray into the market is the PictureMate. It's an inkjet device designed solely for producing 10 x 15cm (4 x 6in) prints, either standalone or tethered to a PC.

The ink system involves a six-chamber cartridge of pigment inks which are rated better than silver halide for colour-fastness and water resistance. The traditional cyan, magenta and yellow tanks are supplemented by photo black, red and blue ink chambers. This arrangement theoretically improves graded tones and output, resulting in prints with richer, darker colours.

The ink chambers are housed in a cartridge that looks like a VHS cassette which slips into a cavity at the bottom-rear of the unit. The print head traverses the carriage in the same way as conventional inkjet printers, but the cartridge

remains stationary, delivering ink on demand. The result is powerfully vibrant photos.

Printing is done via the integrated 4-in-1 flash card reader which accepts Memory Stick, SD, CompactFlash and xD media cards, or directly from a PictBridge-enabled camera. Users can print a thumbnail sheet and then choose which images to print from the LCD. A CF card with 80 high-res images takes one minute and 55 seconds to print a sheet of 20 thumbnails. Direct printing from the flash card takes two minutes and 22 seconds, while an image sent from a PC using the bundled PhotoQuicker software takes over five minutes.

Replacement cartridges cost \$46.20 and come with 100 sheets of photo paper. Each cartridge is rated for 100 prints, which works out at 46c per print compared to the 33c per print quoted by a Sydney photo lab. Don't think that you can skimp on the paper: test prints done on generic photo paper produce terrible results.

While the print quality from the PictureMate is arguably equal to that of images produced by a professional lab, you'll have to decide whether the convenience and control of printing your photos at home is worth the added cost.

David Lin

## Dell All-in-One 922 multifunction printer

Dell brings its volume economics to the multifunction printer market with a \$219 stunner.



### Details

Contact	Dell
Phone	1300 303 107
Online	www.dell.com.au
Price	\$219
✓	Inexpensive printing; easy-to-use control centre.
✗	Fuzzy text edges; plastic feel.
Verdict	●●●●○

Considering the popularity of multifunction printers, it's little wonder that Dell is getting in on the act. For a relatively low \$219, Dell's All-in-One 922 has the same print, copy, scan and host-based fax functionality as devices offered by the big name MFD manufacturers. It provides decent 4,800 x 1,200 print resolution, with 19ppm black and 14ppm colour printing speeds and a 15,000 page monthly duty cycle. The scan engine operates at an interpolated 19,200dpi resolution, with a 48-bit CCD.

Frustratingly, you'll need to supply your own USB cable. Also, as the 922 uses a combined colour cartridge, the entire unit must be discarded when just one colour is depleted.

The 922 has a footprint of 43.7 x 44.5 x 29cm and a small LED status display. It holds 100 sheets of paper up to A4 in size, with an output tray capacity of 50 sheets. Dedicated buttons for printing, scanning and copying allow the 922 to be controlled directly from the console or a PC.

The All-In-One Control Centre provides intuitive control over photo printing, faxing and copying settings. You can also perform a number

of "Creative Tasks" such as choosing the size and number of photos you want on a page, printing multipage banners, or running scans through the software's OCR engine.

Other useful features include automatic print head alignment and paper type detection, as well as an ink level indicator.

Although quick, text edging isn't as crisp as it could be, especially at smaller type sizes. Printing large areas of colour on uncoated paper yields good results, with no evidence of over-inking, and colour photos on glossy paper are reasonably detailed. Borderless printing is supported, and the 922 can improve its colour realism with the addition of a photo ink cartridge (\$39).

With a standard black cartridge costing \$29 and tricolour cartridge \$35, the 922 is one of the cheaper units to operate. It also comes with Dell's one-year next business day Advanced Exchange Service and toll-free phone support during business hours. A replacement printer will be sent to you free should something go seriously wrong.

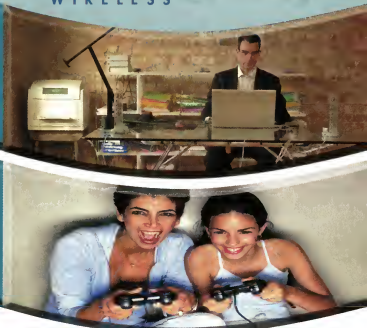
The 922's solid combination of features, ease of use and the low cost of ownership make it an ideal device for both the home and home office.

Valens Quinn

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## Sub-\$2,000 desktops

Even without a monitor, the value in desktops below \$2,000 is stellar. *David Lin rounds up four top machines.*

Industry analysts have been quick to point out that the boom in portable PC sales over the traditional desktop may be an indicator of the future dominance of notebooks. But while portables are gaining in popularity, there's better value to be found in desktop systems.

Four vendors were asked to build the best machines they could, minus a monitor, for under

\$2,000, and the performance of the machines offered are very pleasing.

The vendors came up with some sterling designs, with AMD's Athlon being the processor of choice for high-performance, low-cost systems — the RPM DV Roadster and TI AMD Deluxe are based on Athlon XPs; the Pioneer Cobra and Plus Aspect T14 are based on Athlon 64s. The majority also ship with dual optical drives and dual hard disks in a RAID array — features that would be at home on any power user's desk.

### Pioneer Cobra



Love it or hate it, the Cobra is a head-turner. It's also powerful, with the top Multimedia Content Creation Winstone score of 30.3 in this test, and a 3DMark2003 score of 5,560.



This is due to its MSI K8T Neo premium motherboard, Athlon 64 3000+ processor and 1GB of PC3200 memory. Pioneer also squeeze in an XpertVision Radeon 9800SE card, two Sony optical drives (a multiformat DVD burner and DVD-ROM drive), two 80GB Western Digital Serial ATA hard disks in a RAID 0 configuration, its Dream Vision TV tuner card, and internal modem. Overall, this system represents outstanding value.

#### Details

Contact	Pioneer Computers
Phone	(02) 9690 2888
Online	www.pioneercomputers.com.au
Price	\$1,999
✓	64-bit processor.
✗	Case won't suit everyone.
Verdict	●●●●○

### RPM DV Roadster



RPM's focus is on balancing performance and stability and the DV Roadster features just about everything a power user could want. This includes two 120GB Seagate Serial ATA drives in a RAID 0 array, an Athlon XP 2800+ CPU on an ASUS A7N8X-E motherboard, 1GB of PC3200 memory and a Leadtek GeForce FX 5900XT AGP card. The system also features a LG DVD-RW/CD-RW combo drive and Pioneer DVD writer.

#### Details

Contact	RPM Computers
Phone	(02) 9627 5646
Online	www.rpmcomputers.com.au
Price	\$1,995
✓	Versatile system.
✗	Slowest 3D score.
Verdict	●●●○●

It scores a middle-of-the-range 28.6 in Multimedia Content Creation Winstone, while the score of 5,268 in 3DMark2003 is the lowest of the four PCs submitted. Fantastic build quality helps make up for this, though, and the unit remained completely stable during testing.

### Plus Aspect T14



The T14 features an aluminium Cooler Master Centurion chassis fitted with an Athlon 64 2800+ CPU, 1GB of PC3200 memory and nForce 3-based Gigabyte GA-K8NS Pro motherboard. Two Seagate 80GB Serial ATA hard disks in a RAID 0 array, a multiformat Pioneer DVD burner and a GeCube Radeon 9800 Pro AGP card round out the spec.

Although it isn't the quickest PC, the Aspect is no slouch either: It manages 5,862 in 3DMark2003 and 28.7 in Multimedia Content Creation Winstone. The CoolerMaster case offers heaps of room for further expansion and the machine ships with Ability Office Suite and Business Suite, enough to get an end user started with basic office productivity and accounting.

#### Details

Contact	Plus Corporation
Phone	1800 007 587
Online	www.pluscorp.biz
Price	\$1,995
✓	Beautifully appointed and constructed; additional productivity software.
✗	Slow.
Verdict	●●●●○

### TI AMD Deluxe 2000



The TI has the quickest processor in this roundup, an Athlon XP 3200+, but can't match the Pioneer's raw grunt. It also boasts 1GB of PC3200 memory and a RAID 0 array consisting of



two 120GB Seagate Serial ATA drives. It also has an LG DVD burner and DVD-ROM drive, and a Gigabyte ATI Radeon 9800 AGP card. Unusually, the unit ships with a Vision Plus HDTV tuner card but no antenna.

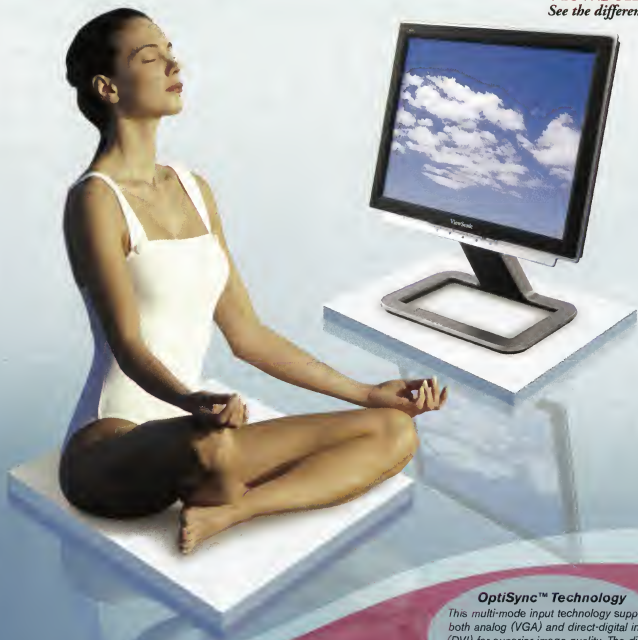
#### Details

Contact	TI Computers
Phone	(02) 9437 5437
Online	www.ticomputers.com.au
Price	\$1,999
✓	HDTV tuner.
✗	*No antenna supplied.
Verdict	●●●●○

The Deluxe is well built, and returns solid benchmarks — a 3DMark2003 score of 5,593 and a Multimedia Content Creation Winstone of 28.7. With the TV tuner, the AMD Deluxe 2000 has all the foundations for a good multipurpose PC.



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VX715	17" (43 cm)	1280 x 1024	25+ nits (typ.) 320 nits (max.)	25 ms (Tr + Tf)	Analog: 15pin D-sub Digital: DVI-D
VX915	19" (48 cm)	1280 x 1024	250 nits (typ.) 260 nits (max.)	12 ms (Tr + Tf)	Analog: 15pin D-sub Digital: DVI-D

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# Dothan notebooks

Intel's Dothan CPU breathes new life into the Centrino platform.

Matthew Overington rounds up four contenders.

Intel is heavily pushing Centrino — and it's no wonder. Unlike in the desktop space, the majority of notebooks on the market favour Intel solutions over AMD ones. All machines listed here are based on the Dothan-cored Pentium M processor. Intel's new flagship mobile CPU is built on a 90nm process and offers slightly faster performance

over its Banias-cored predecessor, albeit with marginally shorter battery life.

Three of these notebooks feature a 1.8GHz processor, the exception being the 2GHz Dell Inspiron 600m. Despite this extra raw processing power, the Dell fails to score higher benchmarks than the other units on test. And while the machines reviewed here are sold as all-rounders, the inclusion of high-end mobile graphics processors in most models enables them to perform competently as portable gaming rigs.

## Dell Inspiron 600m



Dell chose to fit a small 40GB hard disk, 512MB of RAM, an NEC DVD+RW drive and 14.1in screen to its 2.5kg Inspiron 600m chassis for this roundup.

The 2GHz processor doesn't help in Business Winstone 2004 or MobileMark2002 testing but its Multimedia Content Creation Winstone 2004 score of 25.5 is the best in the roundup.

However, the high clock speed also taxes the battery, and the unit falls short of the three-hour mark during rundown tests. As the most business-oriented notebook tested, a poor showing in 3D benchmarking isn't so lamentable. The inclusion of a Gigabit NIC will be considered a boon by some.

### Details

Contact	Dell
Phone	1300 303 107
Online	www.dell.com.au
Price	\$3,199
✓	Gigabit NIC; great price.
✗	Poor battery life; small HDD.
Verdict	●●●●○

## Acer TravelMate 8005LMi



The TravelMate 8000 was the first Dothan machine we reviewed (APC July, page 43), and it hasn't lost its lustre.

The system is built on a 1.8GHz Pentium M processor, 512MB of RAM, ATI Mobility Radeon 9700, 15in screen, an 80GB drive and a Matsushita multifunction DVD writer. Like the Dell, a Gigabit NIC rounds out the feature set.

While bulky, the machine offers a good blend of power and battery life, notching up 21 under Business Winstone 2004 and three hours and 29 minutes under MobileMark2002's battery rundown test. The high-spec video processor also helps the TravelMate to a 3DMark2001 score of 9,989, indicating it's well suited to gaming after work hours, too.

### Details

Contact	Acer
Phone	1300 769 601
Online	www.acer.com.au
Price	\$4,499
✓	Great 3D performance; Gigabit NIC.
✗	Bulky.
Verdict	●●●●○

## Protac Excel G556



The base system comprises a 1.8GHz Pentium M processor, 512MB of RAM and a 15in screen. It also features an ATI Mobility Radeon 9600, which helps drive the 3DMark2001 score up to 9,754 while still managing three hours and 21 minutes under MobileMark2002's battery rundown test. Multimedia Content Creation and Business

Winstone 2004 scores of 23.5 and 19 respectively are average.

While the Protac is a solid performer, the unit is hampered by a mere 40GB of hard disk space, the Toshiba DVD-RW drive is limited to burning -R media, and there's no Gigabit support. Although the Protac unit is keenly priced at \$3,500, there are better deals to be found if you hunt around.

### Details

Contact	Protac
Phone	(02) 8748 8888
Online	www.protac.com.au
Price	\$3,500
✓	Solid performance; battery life.
✗	Small hard drive; no Gigabit support.
Verdict	●●●○

## AOpen OpenBook 1557



AOpen's entry boasts similar dimensions and specs to the Acer, including the processor, 512MB of RAM, 15in screen and an 80GB hard drive. And while it only features an ATI Mobility Radeon 9600, it manages benchmark scores only a shade slower than the Acer. The 1557 achieves 24.3 and 20.3 under Multimedia Content Creation

Winstone 2004 and Business Winstone 2004 while excelling in battery rundown testing, managing a full five hours under MobileMark2002. It also includes a Ricoh RW8165 DVD+RW burner.

The only real failing is a lack of Gigabit Ethernet support, but this isn't an issue unless you're running a high-speed network. The bundle also includes a Targus notebook bag and mini optical mouse.

### Details

Contact	BlueChip Infotech
Phone	1800 803 802
Online	www.bluechipit.com.au
Price	\$3,399
✓	Great battery life.
✗	No Gigabit support.
Verdict	●●●●○



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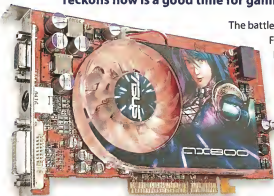
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# ATI Radeon X800 Pro video cards

With ATI's latest round of performance cards hitting the shelves, and rival companies fighting for market share, **Asher Moses** reckons now is a good time for gaming.



*For fanatical gamers: the latest generation ATI card is faster and smoother, but hardly revolutionary.*

The battle for frame rates is heating up again.

Following Nvidia's introduction of the NV40, ATI has released the Radeon X800 Pro. It's based around DirectX9 and Pixel Shader 2.0 and the Pro model sits below the X800 XT in the range (reviewed APC July 2004, page 44).

The X800 Pro's spec sheet indicates a number of minor differences between the X800 Pro and the previous generation card, the 9800 Pro. The core clock speed jumps 25% from 380MHz to 475MHz, while the memory clock is also raised by 32%, from 680MHz to 900MHz. This enables a memory bandwidth increase from 21.8GB/s to 28.8GB/s.

also on the way), conform to the JEDEC standard and include GDDR3 memory. While these specs don't necessarily translate into real world performance, this is no minor update.

## COMPRESSION TRICKS

The most significant architectural improvements implemented in the X800 line are "3DC Normal Map Compression" and "Temporal Anti-Aliasing". Put simply, normal mapping is an enhanced form of bump mapping, used in games such as *Far Cry* to increase the detail of an object without requiring huge polygon detail. ATI's 3DC technology attempts to compress normal maps to reduce the load on the GPU, while ensuring that little to no quality is lost. ATI claims 3DC offers 4:1 compression without a great loss in quality.

Conversely, Temporal Anti-Aliasing enhances images by slightly altering sampling patterns for odd and even frames. At a high frame rate, the eye is "tricked" into seeing a smoother image, effectively doubling the sampling rate. With Temporal Anti-Aliasing enabled, traditional 6x anti-aliasing looks more like 12x anti-aliasing. But there's no performance hit in enabling this feature, as only the sampling pattern changes, not the number of samples taken.

The catch is that V-Sync has to be enabled, which affects the frame rate of displayed images (see "Visual Voodoo" on page 138 for further details). Temporal Anti-Aliasing requires a minimum frame rate of 60fps before it can trick the eye, and will automatically turn off when frame rates dip below this level.

The X800 is manufactured using a low-k dielectric process and utilises GDDR3 memory chips, so power consumption and heat output are both quite low. All the cards on the market are built to ATI's reference designs, and they all feature an unobtrusive heatsink and fan unit.

## Benchmarks

3DMark2001SE (1,600 x 1,200 x 32-bit)

0	ASUS AX-800 Pro	17,565	20K
0	MSI RX800 Pro-10256	17,543	20K
0	PowerColor X800 Pro	17,590	20K
0	Radeon 9800 Pro	12,574	20K

*Generation next: the rival cards aren't separated by much in performance, but all leave the 9800 behind.*

## EVOLUTION

Most of the changes between the 9800 and X800 Pro cards involve the enhancement of existing features. The vertex shader, used to convert geometrical 3D data for a scene into one appropriate for a 2D display, now features six pipelines instead of four, and can process trigonometric data more efficiently. In addition, the HyperZ engine (used to exclude triangles which don't need to be rendered in a

particular scene) is now supported at all resolutions up to 1,920 x 1,080. Twelve pixel pipelines mean that the X800 Pro can render up to 12 pixels in parallel per clock (instead of eight in the 9800 Pro).

The X800 Pro cards tested here all employ the AGP BX interface (though PCI-Express versions are

## PCI-Express

Before purchasing one of these cards, it's important to consider that PCI-Express-based motherboards are only just hitting the market. This bus interface will effectively replace AGP once it becomes adopted in the mainstream. However, AGP cards will be available for some time to come and there won't be a significant performance boost in the early days, as current chipsets can't make full use of the 16x speed offered by the PCI-Express interface anyway.

## How we tested

Each card was tested on a uniform test bed with a 3.2GHz Pentium 4 processor, Abit IS7 (i865PE) motherboard and dual sticks of 512MB OCZ DDR500 memory. Both Windows XP and Catalyst driver revision 4.5 were employed.

A 256MB ATI Radeon 9800 Pro was used as a basis for comparison between the X800 Pros and the previous generation of hardware.

Benchmarking was performed using the regular APC graphics suite, including Unreal

Tournament 2004, Halo, AquaMark 3, 3DMark2001SE, 3DMark2003 and Vulpine GLMark. A new addition to the suite is *Far Cry*, which stretches each card to its limits with maximum detail settings and 4x anti-aliasing and 8x anisotropic filtering enabled.

Most of these applications are notorious for bringing even the most high-spec system to its knees, and are appropriate for testing the next-generation of video cards.

## ASUS AX-800 Pro



As all the X800 Pro cards are based on the same reference design from ATI, there's little difference between them in terms of performance and card layout.

All three models tested here feature 256MB of 2ns memory, TV-out and DVI interfaces and similar overclocking options.

The individual benchmark scores of each X800 Pro card are almost identical, so the performance gap is negligible. As a result, choosing a winner for this shoot-out was difficult, but ASUS's offering comes out on top. While its software bundle, consisting of Counter-Strike: Condition Zero, Deus Ex: Invisible War, Ulead Cool 3D 2.0, ASUS DVD XP, PowerDirector 3 and Media Show, isn't as impressive as that offered by MSI, the clincher was its comparatively low price of \$720.

It's important to keep in mind that the performance of all three cards is almost identical, and you should select a card based on your preferred software suite.

Scores of 17,565 under 3DMark2001 at 1,600 x 1,200 pixels, and 7,289 under 3DMark2003 at 1,280 x 1,024 pixels confirms that the X800 is superior to its predecessor in terms of raw performance.

While the X800 Pro may not be an ideal upgrade for owners of a Radeon 9800XT or GeForceFX 5950, those with lower-spec cards from the previous generation — especially those running a GeForce 4 or lower — will undoubtedly regard the X800 Pro as money well spent.

### Details ASUS Radeon X800

Contact	Achieva Technology
Phone	(02) 9742 3288
Online	www.achieva.com.au
Price	\$720

✓ High performance.

✗ Software bundle doesn't beat MSI's offering.

Verdict



## MSI RX800 Pro-TD256



Although the ASUS card gets the gong for price, it can't match the impressive software bundle offered by MSI. The company includes full version copies of Xill,

Prince of Persia, URU and a 14-in-1 games collection, plus an applications set that features MSI Media Center Deluxe II, Adobe Photoshop Album SE + 3D Album, Farstone VirtualDrive + RestoreIT, InterVideo WinDVD and a utilities CD featuring proprietary MSI software and Trend

Micro PC-cillin. All this great software comes at a cost though — the MSI unit is the most expensive card in this roundup at \$799.

The card features the same basic layout as the ASUS and PowerColor offerings, including 2ns memory and analog/DVI outputs. The MSI also manages similar scores under benchmarking, further highlighting the lack of difference between the Pro flavours of ATI's basic design.

All up, the MSI offering is a superior choice

over the ASUS card for new computer owners, but experienced users will already have many of the utilities, including an antivirus suite, which negates the value of some of the software and its high price.

### Details MSI Radeon X800

Contact	MSI
Phone	(02) 9748 0070
Online	www.msicomputer.com.au
Price	\$799

✓ Best software bundle.

✗ High price.

Verdict



*Magic bullet: clack speeds and benchmarks are up, but that doesn't mean you'll shoot any straighter.*

## PowerColor X800 Pro

While PowerColor's offering is an excellent card, it looks a little overpriced next to its competitors. The X800 Pro manages scores of 17,590 and 7,281 under 3DMark2001 and 2003 at resolutions of 1,600 x 1,200 and 1,280 x 1,024 pixels respectively.

While the performance of the card is on par with the other cards tested, and the X800 Pro offers the same 2ns memory and outputs as its ASUS and MSI rivals, its software bundle lets it down. Put simply, while it has a similar monetary value, it's nowhere near as attractive.

The card ships with a copy of Hitman Contracts and CyberLink DVD suite (including PowerDirector SE+, MediaShow SE, PowerDVD, PowerProducer and Power2Go), at a price of \$785. Buyers would be better off purchasing the ASUS or MSI cards, depending on whether price or software bundle is the main priority. While this may appeal to some buyers, we'd rather just have the money.

The negligible difference in performance between the three cards reinforces the message that value for money is key.

### Details PowerColor Radeon X800

Contact	Australia IT
Phone	(03) 9543 5855
Online	www.australiat.com.au
Price	\$785

✓ Performance.

✗ Inferior software bundle.

Verdict



### Software bundles

#### ASUS AX800 Pro

Counter-Strike: Condition Zero	\$69.95
Deus Ex: Invisible War	\$89.95
Ulead Cool 3D 2.0	\$89.95
Ulead PhotoExpress 4.0	\$99
Cyberlink PowerDirector 3	\$149.95
Cyberlink Media Show	\$99.95
Total	\$598.75

#### MSI RX800 Pro-TD256

URU	\$89.95
XIII	\$49.95
Prince of Persia	\$49.95
Adobe Photoshop AlbumSE + 3D Album	\$79.95
Farstone Virtual Drive	\$69.95
Farstone RestoreIT	\$69.95
InterVideo WinDVD	\$129
Trend Micro PC-cillin	\$99.95
Total	\$638.65

#### PowerColor X800 Pro

Hitman Contracts	\$89.95
Cyberlink PowerDVD	\$99
Cyberlink PowerDirector SE+	\$150
Cyberlink Media Show SE	\$99.95
Cyberlink Power Producer	\$99
Cyberlink Power2Go	\$69.95
Total	\$607.80

*Note: Proprietary and other software not far resale are not listed above.*





# 5+ and 8 megapixel digital cameras

As technology moves relentlessly forward, the capabilities of digital cameras continues to impress. Valens Quinn rounds up the latest releases.

## How we tested

Camera testing consisted of taking a number of photos in varied lighting conditions. These included shots in direct sunlight as well as tripod-mounted indoor photos of colourful subjects with tungsten and fluorescent lighting. A portrait was taken to assess skin tone as well as flash range and intensity. Macro modes were also tested to evaluate the minimum capture range.

Images were studied for chromatic aberrations, colour saturation, noise and tonal range, and rated out of five.

To test responsiveness, camera boot-up time was measured, as well as the latency between pressing the shutter button capturing an image.

Auto focus was evaluated using low light and a complex composition. Cameras were measured for time taken to find the correct focal length, and compared to the time the same camera took to resolve the identical scene in normal light. Note that due to space constraints, not all reviewed cameras are printed here. Check out the APC Web site ([www.apcmag.com](http://www.apcmag.com)) for additional reviews.

Technological advances in digital photography have meant rapid drops in price relative to performance. A few years ago, professional digital cameras were limited to about 6 megapixels, and cost upwards of \$8,000. This Labs Challenge tests the latest crop of 5 to 8 megapixel cameras, priced from \$699 to \$999 (5+ megapixels) and from \$1,699 to \$1,999 (8 megapixels).

You might wonder why an average user would need a camera with this kind of resolution, and what's on offer for the money. First of all, the more pixels a camera's charge coupled device (CCD) can capture, the more detail your image will have.

The photos from the cameras tested here can be enlarged to A3-sized prints, while still looking like they came from a lab (provided that you have a decent quality A3 photo printer). Few people need prints this large, but high-resolution images are still valuable because they give you a lot of latitude to zoom in and crop out part of the shot, knowing that the final result will look fantastic.

As this level of camera is geared towards the professional consumer, or "prosumer", they should be easy to use, yet offer a good degree of

control over capture settings to suit complex compositions for professional results.

The products tested here consist of a distinct sub-group of point-and-shoot cameras which, while still having from 5 to 8 megapixel CCDs, are more compact, cheaper and less likely to be used in manual modes than full-blown pro-level units.

The cameras also differentiate themselves by the quality of their lenses, including the focal length, maximum aperture and minimum distance to subject in macro modes. This is less relevant to the point-and-shoot sub-group, as there tends to be less variance between the small lenses. The amount and type of memory supplied also varies, but it appears that Secure Digital (SD) is the most common format supported.

Every camera came with the ability to record video, but for those who value this feature, it pays to make sure the camera can record at least 15fps in 640 x 480 resolution.

There are further camera reviews on the APC Web site. They include the Panasonic Lumix DMC LC1, which stood apart both in terms of price (\$2,499) and target market, but was included because of its 5 megapixel CCD. This camera is really intended for aficionados who are prepared to pay top dollar for a Leica lens, not to mention excellent craftsmanship and a bit of nostalgia.

## apc price-to-performance ratio



The Olympus camera offered a stellar blend of features and performance to take out our Editor's Choice award. The Ricoh Caplio GX also pitched the best set of features for its low price tag. Note that the Panasonic Lumix isn't included in the price-to-performance chart because, while it's a 5MP camera, it's also a lot more expensive than the other units reviewed and is pitched at a different market. APC considered a direct price comparison with these less expensive models unfair.

# Olympus Camedia C-5060 Wide Zoom

Choosing an overall winner in this Labs Challenge was difficult for two reasons. There are two sub-categories of cameras reviewed here: the point-and-shoot and semi-pro. While both capture similar amounts of pixels per shot, the intended uses of the point-and-shooter are certainly less demanding than the semi-pros. As such, the semi-pro have different ergonomics, form factors and degrees of functionality which are reflected in both image quality and price. So, the overall winner had to cross both genres. The Olympus Camedia C-5060 does so with style.

The Canon PowerShot G5 gives the Camedia C-5060 a run for its money in just about every aspect — and produces a great picture — but the Camedia offers a better overall package.

On the point-and-shoot front, the Fujifilm FinePix F610 stands head and shoulders above the rest for its unique form factor, dual LCD, 6 megapixel CCD and impressive image quality. This is the compact camera to beat, but it doesn't meet the needs of a semi-pro.

The Camedia shows early glimpses of its semi-pro lineage via its black metal casing and external flash mount. Also, its 27-110mm 4x zoom lens offers the widest angle on test, and the super macro mode stays in focus an amazing 3cm from the subject. The lens is also reasonably fast, with an f/2.8 to f/4.8 aperture.

When using the Camedia, most of the buttons are accessible with your right forefinger and

thumb, with a few other buttons located on the left edge. The 1.8in LCD has a good refresh rate and is bright and sharp. However, when viewing close-ups of complex images, the frame rate drops somewhat. The LCD can be swivelled up to 270°, and can face into the camera body when not in use.

Response times are good across the board, with only three seconds to boot up and 0.4 second shutter response. The auto focus is quick to resolve images, taking around half a second, and low light scenes are not a problem with the assist lamp and passive AF sensor.

The Camedia isn't short on options, and there's just about anything a shutter bug could hope for including a variety of shot, meter, focus, white balance, exposure and image file modes. You can also view histograms of shots or let the camera point out areas that are over- or underexposed.

The Camedia takes high-quality pictures with the help of its 5.1 megapixel CCD, advanced noise filter and TruePic technology. Testing shows good tonal range and edge sharpness, but there is a bit of noise that the image processor doesn't pick up. In the end, however, the Camedia takes the winning picture.



## Details

Contact	Olympus
Phone	1300 659 678
Online	<a href="http://www.olympus.com.au">www.olympus.com.au</a>
Price	\$1,099
✓	Versatile wide angle lens; low latency; great image quality.
✗	Controls take some getting used to.
Verdict	★★★★

# Canon PowerShot G5

The Canon PowerShot G5 is a fairly plain-looking camera. The black magnesium case features a rubberised hand grip and 1.8in swivel-hinge mounted LCD, which you can position at odd angles to capture shots where you have to hold the camera away from your face. A mono LED provides at-a-glance information about the camera's settings.

The G5 sports a 35-140mm lens with a fast f/2-3.0 aperture, which lets in lots of light. While not as wide as the Camedia, the G5's lens makes up for it with an extra 30mm of telephoto length. But while the PowerShotG5 is very good on the macro front, it can't beat the Camedia's impressive Super Macro mode.

The G5 gives photographers extensive manual control over their shots, although the controls are a little confusing at first. The FlexiZone AF/AE feature, for instance, lets you pinpoint exactly where you want to measure exposure and focus

the camera. There are three additional exposure metering modes, plus a nine positions for white balance and a number of different flash modes for use with internal and external flashes. The real time histogram aids light balancing and identifies areas of overexposure.

Extending the lens takes about four seconds and shot latency is less than half a second, with high detail settings. The auto focus responds well in low light tests and resolves images in no time with the help of a photo-assist light.

The G5's ISO 50 sensitivity helps produce some very clean shots, and the DIGIC processor does a fair job of providing good tonal range across the board. The 5 megapixel CCD captures excellent detail, and images are stored on a 32MB CompactFlash card.

The batteries can be charged in-camera, which is a nice touch, as is Canon's bundled remote capture software.



## Details

Contact	Canon
Phone	1800 021 167
Online	<a href="http://www.canon.com.au">www.canon.com.au</a>
Price	\$999
✓	Extensive manual control over images; fast lens.
✗	Complicated controls.
Verdict	★★★★



## Details

Contact	Fujifilm
Phone	1800 226 355
Online	www.fujifilm.com.au
Price	\$899
✓	Unique form factor and dual display design.
✗	16MB memory will fill up quickly; xD only.
Verdict	●●●○

## Fujifilm FinePix F610

The Fujifilm FinePix F610 is the only camera in this roundup designed to be held upright, rather than on its side. Fujifilm claims there's less camera shake this way, which appears to be true, especially when holding it in one hand.

The CCD captures 6.3 million pixels and a 12 megapixel interpolated mode enhances the image for very large prints. It's unlikely that many users will need this feature, but the results are good, with detailed edging and minimal noise.

The camera is ready for action in just 1.3 seconds. The dual display mode provides a 1.8in LCD for image previews, plus a second panel for displaying camera settings.

A recharging cradle is included, but the bundle would be better value with more memory. With

movie capture up to 30fps, plus the hefty 12 megapixel still image mode, you'll fill the supplied 16MB very quickly. And the FinePix only accepts the xD Picture Card format.

In review mode, you can trim your images and save them as a separate files, and there are two continuous "action" shot modes. The first captures five shots at 0.3 second intervals, and the second begins capturing up to 25 shots when you hold down the shutter button, but keeps just the last five from the point you release the button.

Overall, the FinePix F610 has just about everything both happy snappers and enthusiasts could want, and it fares well in image testing. While not the cheapest camera in this roundup, the FinePix is a versatile choice.



## Details

Contact	Hewlett-Packard
Phone	13 23 47
Online	www.hp.com.au
Price	\$999
✓	Long 8x telephoto lens; digital flash feature.
✗	Slow shutter and auto focus.
Verdict	●●●○

## HP Photosmart 945

HP's Photosmart 945 is aimed at the semi-pro photographer. It has an assortment of advanced features, although it's missing an external flash mount and can't save images to a RAW format.

The very impressive 37-300mm lens provides 8x magnification — more than any other camera in this Labs Challenge — but this comes at the cost of a reduced wide angle.

Navigating the controls is straightforward. Your right hand fits comfortably around the camera, leaving your thumb and forefinger above the mode wheel and menu navigation buttons. Shot settings include a burst mode and auto exposure bracketing. Advanced photographers can set exposure, white levels, ISO, aperture, shutter, metering and auto focus settings.

The auto focus is sluggish, especially in low light conditions, and there is often a few seconds' delay while the system tries to resolve the image. Also, the shutter latency makes action shots tricky to capture, something that shouldn't be a problem for a camera at this price level.

The digital flash, however, is an excellent feature. It analyses an image and brightens up darker areas without using the actual flash, and is ideal for situations where the sun is behind your subject but a fill flash would wash out the image. Testing indicates good tonal range, but some jagged edges and loss of detail are evident.

To sum up, the 945 has a good zoom lens and flash, but if you need a camera for quick shots or fast action, look elsewhere.



## Details

Contact	Ricoh
Phone	1300 363 741
Online	www.ricoh.com.au
Price	\$699
✓	1cm macro; solid metal camera body; flash mount.
✗	Some colours appear unrealistically bright.
Verdict	●●●○

## Ricoh Caplio GX

The Caplio GX looks a bit like an SLR and is clearly aimed at the prosumer. However, its performance is closer to that of a point-and-shoot camera.

The Ricoh scores points for its rugged metal body, which has a gritty finish so it's easy to grip, and its flash mount or "hot shoe" for a larger flash. Most impressive, however, is the 1cm macro mode — great for extreme close-ups. The Caplio's 5.1 megapixel CCD and Ricoh 3x zoom lens are complemented by 16MB of internal memory. Add an SD card for more storage.

Using the Caplio is straightforward. There's a wheel control for selecting auto, manual and review modes, audio and video recording, and setup. There are also six different scene presets to choose between, including those designed to deal

with candlelight, nighttime and photographing text. Then there are three different multishot options — continuous mode, stream and memory reversal multishot. Stream records 16 images in about three seconds and saves them in a group, and memory reversal continuously shoots while you hold the shutter button, but only records the last three seconds before you let go. Direct printing is also supported.

While the Caplio scores reasonably well in the detail capture tests, it occasionally produces unrealistically vibrant purples and reds. Offsetting this minor defect are the Caplio's good points. Not only is it one of the cheapest cameras tested, it has a good selection of features for the enthusiast, a great macro mode and a robust case.

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# Olympus Camedia C-8080 Wide Zoom



## Details

Contact	Olympus
Phone	1300 659 678
Online	<a href="http://www.olympus.com.au">www.olympus.com.au</a>
Price	\$1,699

✓	Price; image quality; features; ergonomics.
✗	Less telephoto range than others.
Verdict	●●●●●

Moving up to 8 megapixels, the Olympus Camedia C-8080 earned the coveted Editor's Choice award in a tough field. All the cameras tested have relatively good image quality, but the Olympus provides a winning mix of ergonomics, responsiveness, features and price.

The Sony Cyber-shot F828 should also be noted for its silky-smooth manual zoom lens, build quality and 256MB memory card, but it can't keep up with the Olympus' excellent image quality.

The C-8080 looks professional, thanks largely to its black magnesium alloy case and large lens. The moulded grip is comfortable and a cluster of buttons on the right provides direct access to many of the camera's functions. There's an extensive set of shot controls and features worthy of an 8 megapixel camera, and the carousel-style interface makes it easy to select them.

Both the electronic viewfinder (EVF) and LCD provide very detailed and accurate views, and the LCD is mounted on a four-position hinge.

While the lens provides just 5x magnification with a focal length of 28-140mm, it's fast at the f/2.4 maximum aperture. Magnification can be enhanced to 15x with the digital zoom, and while a manual zoom ring is preferred, the motor-driven lens is very quick and precise.

In fact, speed is one of the C-8080's major strengths. Booting up the camera takes less than one second, even though the lens needs to

extend as part of the process. Shutter latency is barely perceptible at around 55ms, and the Camedia C-8080's auto focus system is the fastest in the group, its combination of passive sensors and AF assist lamp ensuring top marks in our normal and low light shots.

There is little delay when reviewing the photos stored in the memory, and the camera responds quickly to zooming and panning large images. The LCD has a high frame rate and doesn't stutter, even when the histogram is displayed simultaneously.

While the auto exposure mode is effective, the histogram feature provides real time information for the entire image. Alternatively, you can direct it to measure a specific point. The "direct histogram" function overlays areas of high and low exposure onto the image preview, plus the framing grid and portrait outline help improve your compositions.

The quality of the C-8080's photos is first rate — vibrant and full of detail, with very low noise and no trace of chromatic aberrations. Tonal range and low light detail are similarly impressive.

What really draws everything together, however, is the price. Not only does the responsive and well-designed C-8080 take the best pictures, you get all this for \$200 to \$300 less than the competition. This also includes a 32MB CF card, plus a lens hood and remote. All in all, you won't find a better 8 megapixel camera.

## Canon PowerShot Pro1

The PowerShot Pro1 fills the gap between Canon's 5 megapixel PowerShot G5 and its professional range of digital SLRs. It features an L-series lens (the same as Canon's pro cameras) made from fluorite and ultra-low dispersion lens elements.

The 28-200mm lens provides 7x magnification, driven by a multiple speed ultrasonic motor. Lens movement is controlled by a motorised zoom ring, which isn't as precise as a fully manual system. The f/2.4 aperture is fast, however, giving you extra latitude for action shots and darker environments. The zoom ring doubles as a manual focus control, and a magnified thumbnail of your shot appears automatically to help with the finetuning.

The Pro1 is a compact unit thanks to its retractable lens. The EVF is clear enough, but you can't change its position for a more comfortable angle. However, the 2in LCD is movable.

An active metering system is used to measure focus, but it struggles to get a fix on the test

subject when zoomed in. The auto focus system takes some time to resolve images, not to mention a lengthy three seconds to boot up.

The Pro1 features extensive manual, automatic and semi-auto control over camera settings. Included are six white balance conditions and two presets, plus 12 EOS-based shooting modes and two custom memories. Light sensitivities from ISO 50 to ISO 400 are supported.

There's no live histogram overlay, but the review mode includes a static histogram, plus an exposure map, audio tag and index view. The RAW conversion tool changes JPEGs to RAW images should you forget to do so.

The camera ships with a 64MB CF card and Canon's excellent software suite. Images show good tonal ranges and are sharp and vibrant, but should really support USB 2.0 for faster transfers.

The Pro1 has a desirable professional pedigree, but this isn't enough to put it in the winner's circle.



## Details

Contact	Canon
Phone	1800 021 167
Online	<a href="http://www.canon.com.au">www.canon.com.au</a>
Price	\$2,199

✓	Compact design and comprehensive feature set.
✗	Sluggish auto focus in low light; powered zoom.
Verdict	●●●●○



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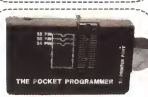
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## Konica Minolta DiIMAGE A2

Konica Minolta has packed the DiIMAGE A2 with many electronic enhancements. The auto focus system, for instance, can predict movement in three-dimensional space. This means you don't lose focus if the subject moves just as the shutter button is pressed.

Another electronic aid is the anti-shake system. The CCD is on a movable platform which shifts in the opposite direction. It can't smooth out really bumpy situations, but it can give you a couple of extra  $f$ -stops before a tripod is required.

The A2 provides comprehensive control over shot settings, metering, white balance, flash and ISO. There are separate dials for adjusting aperture and shutter speed, plus five custom memories for storing favourite camera settings.

The AF system is very quick — rivalled only by the Olympus Camedia C-8080. Low light is handled reasonably well, and the manual zoom ring is a nice change from the slow and noisy motor-driven alternatives. While a histogram is present, the A2 is missing an exposure map function. The night movie mode and grip sensor that initiates the autofocus in continuous mode are thoughtful inclusions, however. Images lack detail at high magnification and colours don't transition as smoothly as the other cameras.

The A2 is good value considering the shot enhancing features, and the supplied Ulead VideoStudio 7SE movie editing software is a nice touch. The lack of any supplied memory prevents the A2 from achieving a higher score.

### Details

Contact	Konica Minolta
Phone	1800 226 355
Online	www.konicaminolta.com.au
Price	\$1,899
✓	Anti-shake; fast auto focus; stacks of features.
✗	Detail capture; no memory.
Verdict	●●●●○

## Nikon Coolpix 8700

The Nikon probably has more features than most will need, but there are a few nice touches. It has a panorama mode, which shows an overlay of your previous shot so you can match it with the next, plus a time lapse option which can capture 1,050 frames at up to 60 minute intervals.

This camera has the longest telephoto range, stretching out to 280mm, but its wide-angle suffers at 35mm. There are consistent problems focusing on distant objects in low light conditions and with near subjects in macro mode. In brighter light, auto focus is considerably better, but there is still a noticeable delay.

Image quality is terrific, tying with the Camedia 8080 for first place. The 8700 scores top marks for image saturation, with sharp detail and minimal

noise. The bright and clear 1.8in LCD comes on a swivel mount, and the EVF is detailed enough to discern shots that are out of focus.

There are two custom memories for saving combinations of exposure, white balance, flash, metering and focus setting, plus 12 scene modes. In Review mode, the Quick View shows you the shot just taken. Four images can be viewed simultaneously as thumbnails, and an included histogram and exposure map come in handy. The grid overlay helps with image composition.

The Nikon is a great unit except for a few minor issues — it's slow to focus and even though the camera offers outstanding image quality, it doesn't ship with any memory.

### Details

Contact	Maxwell Optical Industries
Phone	1300 366 899
Online	www.maxwell.com.au
Price	\$1,999
✓	Long zoom range; great image quality.
✗	Slow auto focus in low light; no memory.
Verdict	●●●●○

## Sony Cyber-shot DSC-F828

The first thing that strikes you about the Sony Cyber-shot DSC-F828 is its split-body design, where the large lens barrel is joined to the camera body by a sturdy hinge. The idea is that the lens can be moved 70° upwards or 30° downwards.

The 7x 28-200mm Carl Zeiss telephoto lens has a super fast  $f/2.0$  maximum aperture. The anti-reflective coating improves contrast and sharpness and reduces lens flare and reflection. The zoom lens and focus are fully manual.

Also new on the F828 is a four-colour CCD. This adds an additional emerald filter. Intended to increase the range of colour the camera can capture, leading to more realistic colour rendition.

A large control wheel designates program, aperture and shutter priority modes, as well as

review, setup, movie and four scene settings. There's also a joystick for customising the auto focus spot metering and navigating menus.

Startup takes just over a second, with little shutter or focus latency thanks to the superb Hologram AF Assist. This uses a laser pattern to guide focus, which results in both fast focusing and impressive low light accuracy. CF cards and MemoryStick are supported, with a 256MB MemoryStick Pro included.

Image tests reveal higher than expected noise, as well as chromatic aberrations around bright elements. Colour saturation, however, is vibrant and realistic thanks to the four colour CCD.

Despite some shortcomings, the F828 has so many excellent features it ranks second overall.

### Details

Contact	Sony
Phone	1300 137 669
Online	www.sony.com.au
Price	\$1,999
✓	Fast and responsive; great auto focus; 256MB memory.
✗	Chromatic aberrations; noisy images.
Verdict	●●●●○



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- Cormain Tel: 02 8824 7585  
www.cormain.biz
- EYO Technologies Pty Ltd. Tel: 02 9790 8822  
www.eyo.com.au
- I-Tech Tel: 1800 833 883  
www.i-tech.com.au
- ARC Computers Tel: 02 97488322  
www.arc.com.au

#### QLD:

- OZ Technologies Tel: 07 3205 5005  
www.oztechnologies.com

#### WA:

- W.A Data Pty Ltd. Tel: 08 9249-3622  
www.wedata.com.au
- PLE Computers Tel: 08 9309 4771  
www.ple.com.au

#### TAS:

- Tasmanian Principle Computers  
Tel: 03 6234 5677  
www.tasmanianpc.com.au



## 5+ megapixel digital cameras specifications



Manufacturer/model	Ricoh Caplio GX	Sony Cyber-shot DSC-P93*	Kodak EasyShare L5753*	Fujifilm FinePix F610	Konica Minolta DiMAGE G600*	Canon PowerShot G5	HP Photosmart 845	Olympus Camedia C-5060 Wide Zoom	Panasonic Lumix DMC-LC1-K*
Price	\$699	\$699	\$799	\$899	\$899	\$999	\$999	\$1,099	\$2,499
Megapixels	5.1	5.1	5	6.3	6	5.1	5.3	5.1	5.2
Verdict	3.5	3	3	3.5	3	4	2.5	4.5	3.5
Max resolution (unenhanced)	2,592 x 1,944	2,592 x 1,944	2,569 x 1,929	2,848 x 2,136	2,816 x 2,112	2,532 x 1,944	2,608 x 1,952	2,592 x 1,944	2,560 x 1,920
Focal length (mm)	5.8-17.4	7.9-23.7	6.0-16.6	7.7-23.1	8.0-24	7.2-28.8	7.6-61	5.7-22.9	7-22.5
Focal length (35mm equiv)	28-85	38-114	36-100	35-105	39-117	35-140	37-300	27-110	28-90
Max aperture (W/T)	1/2.5-4/4.3	1/2.8-4/5.2	1/3.0-4/4.9	1/2.8-4/4.9	1/2.8-4/4.9	1/2.0-4/3.0	1/2.8-1/3.1	1/2.8-4/4.8	1/2.0-4/2.4
Optical zoom	3x	3x	2.8x	3x	3x	4x	8x	4x	3.2x
Viewfinder size (in)	1.8	1.5	1.8	1.8	1.5	1.8	2	1.8	2.5
Electronic viewfinder	X	X	X	X	X	X	✓	X	✓
Memory supplied	16MB internal	32MB MS	32MB internal	16MB xD	16MB SD	32MB CF	32MB SD	32MB xD	16MB SD
Card types supported	SD, MMC	MS	SD, MMC	xD	SD, MMC, MS	CF, MO	SD, MMC	xD, CF, MD	SD, MMC
Hot shoe	✓	X	X	X	X	✓	X	✓	✓
RAW image support	✓	X	X	X	X	✓	X	✓	✓
Remote	X	X	X	X	X	✓	X	✓	✓
Lens hood	X	✓	X	X	X	X	X	✓	✓
Camera case	✓	X	X	X	X	X	X	✓	X
Connection type	USB 1.1	USB 2.0	USB 1.1	USB 1.1	USB 1.1	USB 1.1	USB 2.0	USB 1.1	USB 2.0
Warranty	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr C&R	1yr RTB	1yr RTB

\* See [www.apcmag.com](http://www.apcmag.com) for full review.



## 8 megapixel



Manufacturer/model	Olympus Camedia C-8080 Wide Zoom	Konica Minolta DiMAGE A2	Nikon Coolpix S700	Sony Cyber-shot DSC-F828	Canon PowerShot Pro1
Price	\$1,699	\$1,899	\$1,999	\$1,999	\$2,199
Weight (g)	660	565	480	906	545
Megapixels	8	8	8	8	8
Verdict	4.5	3.5	3	4	3.5
Max resolution (unenhanced)	3,264 x 2,448	3,350 x 2,482	3,264 x 2,448	3,264 x 2,448	3,264 x 2,448
Focal length (mm)	7.1-35.6	7.2-50.8	8.9-71.2	7.1-51	7.2-50.8
Focal length (35mm equiv)	28-140	28-200	35-280	28-200	28-200
Max aperture (W/T)	1/2.4-1/3.5	1/2.8-1/3.5	1/2.8-4/4.2	1/2.0-1/2.8	1/2.4-1/3.5
Optical zoom	5x	7x	8x	7x	7x
Viewfinder size (in)	1.8	1.8	1.8	1.8	2
Electronic viewfinder	✓	✓	✓	✓	✓
Memory supplied	32MB xD	none	none	256MB MS	64MB CF
Card types supported	xD, CF, MO	CF, MO	CF, MD	CF, MS	CF, MO
Hot shoe	✓	✓	✓	✓	✓
RAW image support	✓	✓	✓	✓	✓
Remote	✓	X	X	X	✓
Lens hood	✓	✓	X	X	X
Camera case	✓	X	X	X	X
Connection type	USB 2.0	USB 2.0	USB 1.1	USB 1.1	USB 1.1
Warranty	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB

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# 19in CRT monitors

While LCD monitors are the flavour of the month, there's life yet in CRTs. Nick Race examines seven top contenders.

With LCD monitors topping the sales charts, you could be forgiven for thinking that 100-year-old glass tube technology is being shown the door. But this is certainly not the case. For games, graphic design and digital video, the cathode ray tube (CRT) is undoubtedly still the way to go.

LCDs suffer from screen latency issues when displaying fast moving items due to the amount of time it takes to switch the transistors on and off. Most screens these days hover around 25ms latency, with faster displays down to 16 or even 12ms. Fast motion tends to blur screen images and cause "ghosting", which severely affects the accuracy of the displayed image and is unacceptable for gamers and video editors alike.

CRT monitors don't suffer from the same affliction. As a CRT's electron gun redraws an image, typically between 60Hz and 120Hz, it's quicker to adapt and change what's being displayed. Tube monitors also have a shorter ghosting time, as phosphor pixels cease to glow when not targeted with electrons.

## CRT VERSUS LCD

One of the selling points of LCD technology is that CRT monitors have long been suspected of emitting dangerous levels of radiation.

The Australian Radiation Protection and Nuclear Safety Agency has quantified these claims (see [www.arpansa.gov.au/is\\_vdt.htm](http://www.arpansa.gov.au/is_vdt.htm) for more information), and CRTs have been



**Testing times:** Nokia's Monitor Test is an excellent tool for monitor calibration.

found to be non-hazardous to the user.

Another benefit of CRTs is that, unlike LCDs, they don't have a set number of pixels — CRTs can output a clear image at any resolution the electron gun is capable of resolving. With lower resolutions, image quality doesn't degrade and screen geometry is maintained. With an LCD unit, the monitor fudges the display, combining neighbouring pixels to share the colour output and leading to a blurry image.

The downside of cathode ray tube technology is that the screen is constantly redrawn, meaning poor quality monitors or those with lower refresh rates can tire the eyes of some users.

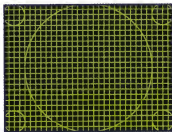
Though the old bulky form of the CRT may no longer appear on the desks of business or most home users, tube technology still appeals to users relying on a quickly updated and accurate display at multiple resolutions.

All the screens in this roundup include three-year warranties. This isn't the case with all monitors on the market today so, as always, make sure you establish what kind of support is available for any product you intend to purchase.



## Bonus CD software

Nokia Monitor Test 1.0.0.1



**Keep it straight:** the geometry tool in Nokia's Monitor Test shows any deviation in straight lines.

## How we tested

Though monitor evaluation is subjective by nature, all screens were tested in a common controlled environment using Nokia's Monitor Test v1.0.0.1, included on this month's cover CD set.

Tests designed to gauge a monitor's performance in geometry, brightness and contrast, convergence, focus, moiré effects and screen jitter were all performed. The screens were set at 1,600 x 1,200 and 1,280 x 1,024 at the highest supported refresh rate.

Geometry tests measure a monitor's ability to display accurate images over the entire surface of the display. This is

especially important with flat-screen CRTs, as the angle of incidence between the electron gun and the corners of the screen are greatest.

Brightness and contrast tests determine a unit's ability to accurately control the output of the electron gun.

Convergence tests measure the gun's accuracy, and the ability of the unit to focus the beam on a particular point. Colour bleeding will occur if the convergence of the beams is incorrect at any point on the screen.

Focus tests ensure the accuracy of the electron beam's focus. If the electron beam

doesn't accurately draw a point on the screen, the image is slightly blurred.

Moiré effects occur because of interference between the screen's electron mask and the electron beam at certain resolutions. The effect occurs on all monitors at different resolutions, but the effect can vary depending on the type of mask used and the unit's ability to focus.

Screen jitter occurs when the CRT's beams are quickly instructed to turn on and off. A pass mark in this test ensures a unit's ability to accurately display an image, as a jittery monitor can present images that appear to move on the screen.

# NEC MultiSync FE991SB

Building an outstanding monitor is a delicate balance of trade-offs. The manufacturer has to ensure that plenty of power flows to the electron gun to maximise brightness and colour, but at the same time keep a sharp focus.

NEC's MultiSync FE991SB is the best performer in the roundup, boasting a maximum resolution of 1,792 x 1,344 pixels at a refresh rate of 68Hz. It's well-priced and a wise choice for anyone spending long hours in front of a PC.

The screen's geometry is good at both tested resolutions, with a slight curve inward at the top and bottom of the screen. Only the IBM ThinkVision C190 achieves better results.

The adjustment of brightness and contrast is excellent. The screen shows a slight lack of distinction between 1% and 2% grey when testing at a 1,600 x 1,200 resolution, but displays a clearly graduated greyscale from black to 1% running at a resolution of 1,280 x 1,024 without any changes to the corresponding menu controls.

For graphics work, movie playback or gaming, the FE991SB has a SuperBright function which is activated by a button located next to the menu system. Increasing the brightness accentuates colour comparison and detail, but it's unsuitable

for everyday work as it can be very tiring on the eyes.

The MultiSync focuses the electron beam fairly accurately across the tube's surface, although slight blurring is visible in the corners of the screen. This is particularly noticeable when displaying white text on a black background. A similar amount of blur is evident at both test resolutions due to NEC's use of flat-screen technology.

A menu option to remove moiré (a slight waviness or movement in alternating patterns) from affected areas is also included. Tests on a number of different moiré-prone patterns at different resolutions show the function can't completely remove the effect. However, adjusting the menu settings slightly reduces the effect.

A small amount of jitter is evident, though it isn't overly pronounced and falls within an acceptable range, even for graphic artists.

All in all, the NEC MultiSync FE991SB is an outstanding monitor for professionals and demanding home users.



## Details

Contact	NEC Australia
Phone	13 16 32
Online	www.nec.com.au
Price	\$539

✓ Excellent geometry; crisp images; reasonable price.

✗ Slight screen jitter and moiré effect.

Verdict ○○○○○

## Acer AC915

Acer's AC915 is the only screen in this Labs Challenge that isn't flat. The electron gun sits nearly perpendicularly to the screen surface of a curved screen monitor, so the focal length doesn't change. This makes it easier to display a geometrically correct image. The AC915 proves this by providing an almost-perfect test pattern once the electron gun is adjusted. However, when the test pattern colours change, in both 1,600 x 1,200 and 1,280 x 1,024 resolutions, it moves around on the screen.

The unit performs strongly in convergence and geometry tests, and only a little adjustment is required before all white lines generated by the test pattern software are shown clearly with negligible colour bleed. It's also possible to detect differences in shades from a 2% greyscale through to black.

However, focus performance is poor. The Acer's ability to resolve fine text is below par at 1,280 x 1,024 and even worse at 1,600 x 1,200. The image is jittery at the higher resolution too.



## Details

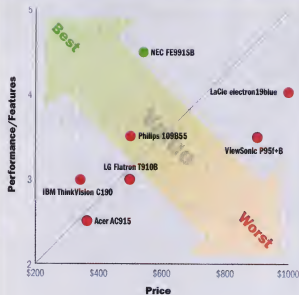
Contact	Acer
Phone	1300 366 567
Online	www.acer.com.au
Price	\$363

✓ Good geometry; low price.

✗ Bad focus; jittery image.

Verdict ○○○○○

## apc price-to-performance ratio



The NEC MultiSync FE991SB offers the best combination of performance at a reasonable price, making it not only the best-performing monitor, but also the best value. Although the LaCie and ViewSonic monitors offer clear images, they are extremely expensive when compared to other 19in units.



### Details

Contact	IBM Australia
Phone	13 24 26
Online	www.ibm.com/au
Price	\$399
✓	Excellent price; moiré cancellation.
✗	Convergence issues.
Verdict	●●●○

## IBM ThinkVision C190

IBM's ThinkVision C190 monitor sits in the middle of the pack in this Labs Challenge, both in terms of price and performance, and is aimed at corporate and home users rather than graphics or design professionals.

The C190 supports resolutions up to 1,600 x 1,200 at 75Hz, and screen geometry is accurate at 1,600 x 1,200 and 1,280 x 1,024. It displays an accurate rendition of a test pattern consisting of a diagram of lines and circles. At the maximum resolution, there's noticeable screen jitter when patterns drawn on the screen change. Generally, however, there's very little distortion.

The screen has noticeable convergence issues at the native 1,280 x 1,024 resolution, but

these are less visible at higher resolutions. Testing also reveals that the ThinkVision C190 struggles to display a single white line on a dark background — the white line is bordered with a blue line along the bottom and a red one across the top.

Changing the menu options and parameters doesn't resolve the issue. This convergence abnormality is most noticeable in the top right and bottom left corners.

Thankfully, this monitor features an effective option to reduce the moiré effect. Once adjusted correctly (which takes a little time), the moiré is barely noticeable across a range of test patterns.

Overall, the ThinkVision C190 is a reasonable performer at a competitive price.



### Details

Contact	LaCie
Phone	(02) 9669 6900
Online	www.lacie.com.au
Price	\$999
✓	Clear, crisp image.
✗	Moiré issues; expensive.
Verdict	●●●○

## LaCie electron19blue IV

Ideally suited to high-end graphics applications, LaCie's electron19blue IV offers a maximum resolution of 1,920 x 1,440 at a refresh rate of 75Hz.

This monitor produces excellent results in screen geometry tests at 1,600 x 1,200. The unit is very accurate at outputting the higher resolutions, and only a slight inward distortion in all four corners is detectable during testing. The distortion is lessened, but still noticeable, after correcting the image via the comprehensive adjustment menu at the lower resolution of 1,280 x 1,024.

Focus is impressive, and the screen shows minimal blurring around all four edges of the screen at 1,600 x 1,200. These are less visible at 1,280 x 1,024, and indicate high output quality.

The LaCie's display is somewhat more susceptible to moiré effects than NEC's MultiSync FE9915B. A moiré canceller is included, but this option increases blur over the entire screen and moves the affected area rather than eliminating it.

Unfortunately, the electron19blue IV has slight convergence issues — a blue line appears in the corners of the screen throughout testing. Adjusting the convergence of the monitor to bring the blue back into sync causes the line to change colour, offering no real solution at either resolution.

Although this unit performs well in all tests, the monitor's high price sets it apart from the other contenders in this roundup.



### Details

Contact	LG Electronics
Phone	1800 725 375
Online	www.lge.com.au
Price	\$499
✓	Good geometry; bright image.
✗	Poor focus.
Verdict	●●●○

## LG Flatron T910B

LG's Flatron T910B pushes shadow mask technology to its limits — and is noticeably brighter than its competitors — but is let down by poor focus.

The T910B performs adequately at a resolution of 1,280 x 1,024, but at the higher resolution of 1,600 x 1,200 blurring at the edges of the screen makes text unreadable.

On the plus side, convergence is good and the displayed image shows only a slight blue tinge to white lines in the extreme edges at all resolutions.

Screen geometry is another positive point. The unit can easily be brought into line by finetuning the OSD. However, some deviation is evident in the bottom corners of the screen,

and fiddling with settings that affect the whole screen or the lower part of the screen fail to improve the image during tests.

The displayed image remains bright at default level settings, which is good news for gamers and graphic artists, but extended sessions in front of the screen may soon tire the user's eyes.

In greyscale testing, the contrast of the unit is clearly visible from around 2% through to white.

Unfortunately, the Flatron suffers badly from moiré. While the unit includes separate horizontal and vertical moiré cancellation option, it quickly loses focus when they are enabled.

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## Details

Contact	Philips Electronics
Phone	1300 651 993
Online	www.philips.com.au
Price	\$499
✓	Small footprint; LightFrame technology.
✗	Geometry issues.
Verdict	●●●●○

## Philips Brilliance 109B55

The Philips Brilliance 109B55 is the smallest unit in this roundup. With a depth of only 45cm, it's a sensible choice for those with limited desk space.

The 109B55 incorporates Philips' proprietary LightFrame technology, which seeks to improve the appearance of graphics and movies by making them brighter.

In tests, the Philips LightFrame hardware and software combination is reasonably successful at picking images out of a Web page, but the tendency for the enhanced images to flick off as soon as any part of the image scrolls out of the LightFrame window is annoying.

It achieves good results in focus tests, displaying only slight fuzziness at a resolution of 1,600 x 1,200 and almost none at 1,280 x 1,024.

Maximum resolution is 1,920 x 1,440 at a refresh rate of up to 60Hz. This makes the Brilliance the second-highest specked monitor in the roundup, pipped only by the LaCie, which is pitched at graphic artists.

The Brilliance 109B55 performs well in jitter and moiré tests. Almost no movement is noticeable during jitter tests — even in the corners of the screen. Although a small arc becomes evident in the middle of the screen during moiré tests, it can be eliminated without impacting on focus.

Screen geometry is this monitor's weak spot, with a distinct S-shaped curve appearing on the left side of the screen that couldn't be eliminated through menu adjustment.



## Details

Contact	ViewSonic
Phone	(02) 9906 06277
Online	www.viewsonic.com.au
Price	\$899
✓	Clear focus; no jitter.
✗	Poor screen geometry; expensive.
Verdict	●●●●○

## ViewSonic P95f+B

Despite being marketed as a professional model, ViewSonic's P95f+B has poor screen geometry. At a resolution of 1,600 x 1,200 pixels, the ViewSonic displays noticeable warping in all four corners of the image, extending along into almost a third of the screen in each direction. At 1,280 x 1,024 it shows warping to a lesser extent in the bottom corners.

This unit performs very well in convergence tests, in line with the market it's aimed at. The screen outputs a very clear line, only showing minor red-coloured issues in the far bottom corners of the displayed image.

Unfortunately, adjusting the screen to eliminate these pulls the rest of the image out of alignment.

Focus is good, and while other screens return better results, the ViewSonic scores points for consistency over the entire display.

A small amount of moiré is evident during testing, but it's easily adjusted at higher resolutions. At 1,280 x 1,024, however, it's difficult to eliminate. Although the moiré is within acceptable limits, be prepared to spend some time fiddling with the onscreen menu to get a perfect image.

The ViewSonic shows a very steady image at its preferred resolution of 1,280 x 1,024. A wide spectrum of colour adjustments and lack of jitter make this monitor seem ideal for graphic designers, but its moiré issues and poor screen geometry may be deterrents.

## 19in CRT monitor specifications

Manufacturer/model	Acer AC915	IBM ThinkVision C190	LG T910B	Philips 109B55	NEC FE915B	ViewSonic P95f+B	LaCie electron19blue IV
Price	\$363	\$399	\$499	\$499	\$539	\$899	\$999
Online	www.acer.com.au	www.ibm.com/au	www.lge.com.au	www.philips.com.au	www.nec.com.au	www.viewsonic.com.au	www.lacie.com/au
Maximum resolution (pixels)	1,600 x 1,200	1,600 x 1,200	2,048 x 1,536	1,920 x 1,440	1,792 x 1,344	2,084 x 1,536	1,920 x 1,440
Refresh rate at maximum resolution	75Hz	75Hz	61Hz	60Hz	68Hz	68Hz	75Hz
Recommended resolution and refresh rate	1,280 x 1,024 @ 85Hz	1,280 x 1,024 @ 85Hz	1,280 x 1,024 @ 85Hz	1,280 x 1,024 @ 85Hz	1,600 x 1,200 @ 76Hz	1,600 x 1,200 @ 87Hz	1,280 x 1,024 @ 85Hz
Dot pitch (mm)	0.26	0.25	0.25	0.25	0.25	0.25	0.24
Viewable area (in)	18	18	18	18	18	18	18
Tube type	Invar shadow mask	Aperture grille	Flat shadow mask	Flat shadow mask	Aperture grille	Aperture grille	Aperture grille



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Wirecom Tel: 03 9356 2790  
www.wirecom.com.au  
**QLD:**  
C&T Technologies Tel: 07 3205 5005  
www.ccttechnologies.com

#### Resellers:

**NSW:**  
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draytek.dsl-warehouse.com.au  
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## Databases

Today's PCs are capable of handling the sort of sophisticated database apps that were once the exclusive province of powerful mainframes. **Robert Peru** puts a selection through their paces.



### Bonus CD software

askSam 5.1 • MySQL 4.0.20a for Windows.

### How we tested

Each application was installed on an AMD Athlon 3200+ computer with 1GB of RAM, running Windows XP Professional Service Pack 1.

To test the features of each program, we created a 41,000 record CSV (comma-separated value) file with 16 columns of text, numerical data, time stamp and monetary values, and imported it into the program's native format.

In the case of StarOffice, we worked with both native CSV data and a converted copy in Access format, both via ODBC. Working with native CSV data through ODBC was extremely slow, so this was avoided where possible.

All apps have nearly identical performance rates for most common functions (sorting, searching and so on).

The other major issue is stability. In testing, StarOffice was the least stable — it frequently locked up or crashed when creating reports, especially when data was dynamically linked to the report. AskSam occasionally stopped accepting user input while compiling a report, but always managed to finish without incident.

The ability to store data complete with complex relationships between data items is one of a computer's most fundamental applications. Database software has existed for decades and was one of the first compelling reasons to use a computer.

The original databases were either glorified card catalogues or stripped-down versions of mainframe and minicomputer programs that were difficult to use. But thanks to the explosion in processing power and storage capacity, today's desktop database application rivals the speed and data handling of something that would have cost hundreds of thousands of dollars 15 years ago.

Today, the real issues of concern for database users aren't speed or storage capacity, but ease-of-use and the ability to publish data in a variety of forms. Every program in this Labs Challenge has a different way of handling user input and data management: Microsoft Access tries to assist beginners through its automated wizards and straightforward interface, as does StarOffice's database component. FileMaker Pro is another program which is designed to be simple and approachable, but not limiting.

More databases are taking advantage of the PC's network capabilities — the most notable being FileMaker. The capacity to package a database as a standalone executable is another way to simplify data sharing, especially when data needs to be presented as a dynamic application.

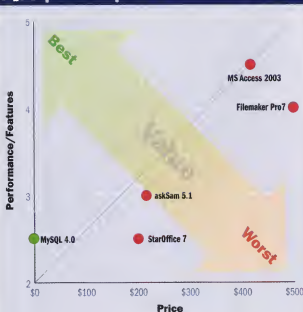
In every case here, the ability to make a standalone app out of a database is only possible with a separate add-on. Other third party

solutions, such as XLineSoft's DB to HTML Express ([www.xlinesoft.com](http://www.xlinesoft.com)), can convert databases into static HTML documents.

Other products are starting to expand the definitions of what a database application is. For instance, askSam deliberately blurs the boundaries between a database and a word processor to handle free-form data. Programs like this don't work for everyone and require a certain amount of refinement to really be usable, but they're a good example of the variety of product available.

The open source and free software movements have made serious inroads into the database market. The bad news is that the vast majority only cater to system administrators and database experts. However, they're free and very powerful in the right hands — StarOffice and OpenOffice already pose a major challenge to Microsoft Office. Likewise, MySQL is giving database servers a run for their money. As these products develop and improve, their fanbase will undoubtedly grow.

### apc price-to-performance ratio



Although Access 2003 is one of the most expensive packages in the roundup, it offers the most complete set of features, enabling it to stand above the competition. MySQL 4.0, the only free software in the roundup, offers the best value for money, while FileMaker Pro 7, askSam 5.1 and StarOffice 7 all fall in the middle ground.

# Microsoft Access 2003

Microsoft Access isn't just a staple of the PC database world because of the success of Microsoft Office, it's popular because it can simplify the development of even the most complex databases.

Compared to most other database programs, the learning curve is steep, especially when assembling complicated forms or reports, and its high cost can make it prohibitive. But if you're serious about producing desktop database apps, almost anything is possible once you understand how the program works.

An Access database consists of several entities: tables for data, queries to return data based on specific criteria, forms to submit or present data, and reports for publishing. New to Access 2003 is the ability to publish data to Web pages, although this function is somewhat limited and not as flexible as FileMaker Pro's equivalent.

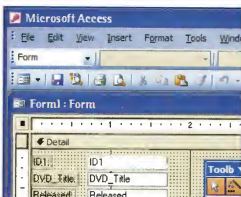
Despite its complexity, Access manages to be user-friendly by offering several ways to perform a single task. For instance, new data can be entered in a free-form fashion, by hand, or imported, with Access making a guess as to what the data type for each field is supposed to be. Similarly, Access does its best to detect the format of data imported from an outside source, such as a comma- or tab-delimited file.

Access offers two ways of programming enhanced functionality into a database: macros and Visual Basic for Apps code. Macros aren't designed to perform advanced business logic, but they're perfect for simple things — switching

views on data, opening and closing queries, and so on. VB code is far more advanced, but its syntax should be familiar to anyone who has written macros in Word. It also allows Access databases to be turned into real applications, although they can only run independently of Access if the Microsoft Access runtime, available separately, is used.

The great thing about this program is the little details that make it so useable. When browsing or filtering a table on-the-fly, the action is multithreaded, so the process of filtering or fetching records doesn't interrupt browsing. A slow database can be analysed for suggestions to improve performance (usually creating indexes) and a database's dependencies (objects which require other objects) can be seen at a glance — a very useful function for complex databases where the elements it relies on may be unclear.

Access uses Microsoft's wizard interface for common tasks like importing data and creating new tables, and the new table wizard includes many common business and household data structures (mailing lists, record collections, and so on). The use of VB also allows Access to talk directly to other Office applications, so a database can publish itself through Word. Access also has a number of on-the-menu methods for sending data to other Microsoft apps, another useful performance enhancer.



## Details

Contact	Microsoft
Phone	13 20 58
Online	<a href="http://www.microsoft.com/australia">www.microsoft.com/australia</a>
Price	\$415; upgrade, \$189
✓	Powerful; integrates tightly with other Microsoft products.
✗	Steep learning curve; price; weak export to Web function.
Verdict	●●●●○

# askSam Systems askSam 5.1

AskSam is something of an oddity among database programs — it's a free-form database, designed for users who have information floating around on thousands of bits of paper.

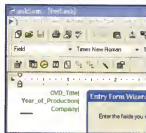
Anyone used to conventional databases may be thrown by the way the program works, since it uses both a conventional record system as well as a free-form, page-based system. Those who don't have preconceived ideas as to how a database is supposed to work will probably benefit the most from this approach.

This app works by splitting a database file into "documents", which are roughly analogous to tables in a more conventional database. These documents can contain structured or unstructured information, or information that's

a combination of structured or unstructured data, such as email. AskSam also ships with a utility called TextPipe that scans imported data and converts it into a more structured format (among the conversion templates included are an email template and a pre-processor for CSV files).

Finally, the program has native importing support for email from many popular clients such as Outlook or Eudora. An SDK programmer's kit for Visual Basic users is also included, allowing the program to be scripted.

If you're looking to organise information that isn't easy to categorise, askSam may prove more adaptable than any of the other products in this roundup. Just be sure to read the manual thoroughly before rushing into anything.



## Details

Contact	askSam
Online	<a href="http://www.asksam.com">www.asksam.com</a>
Price	US\$149.95
✓	Free-form data structure.
✗	May frustrate existing database users.
Verdict	●●●○○



### Details

Contact	FileMaker
Phone	1800 028 316
Online	<a href="http://www.filemaker.com.au">www.filemaker.com.au</a>
Price	\$499

Instant Web publishing:  
ease of use.

Mac-based interface:  
no Windows  
security integration.

Verdict

## FileMaker Pro 7

For decades, FileMaker has been the database application of choice for the Macintosh. Now that it's been ported to the PC, a wider audience will discover an excellent application that caters mainly to home and small office users who need simplicity and directness. And even though it's extremely easy to learn and use, none of the program's power (utilised through its scripting and publishing functions) has been sacrificed.

FileMaker Pro's usability begins with its comprehensive documentation (something many programs skimp on), which clearly explains to newcomers the concept of databases and why they are important. The only problems long-time Windows users may face is that some parts of the FileMaker interface don't adhere to the Windows standard, and user security for

FileMaker files is done through a user account system native only to the application.

One of FileMaker's best features is Instant Web publishing, which securely shares public or private databases across a network through a Web browser interface. No other program in this Labs Challenge (except for possibly MySQL, and even then only after a lot of complicated programming) has anything close to this feature in terms of usability.

FileMaker also features excellent support in languages other than English (including Asian languages) and a built-in scripting engine/macro language called ScriptMaker.

Finally, while it's possible to turn FileMaker databases into standalone applications, it can only be done with an external toolkit.



### Details

Contact	MySQL AB
Online	<a href="http://www.mysql.org">www.mysql.org</a>
Price	Free

Powerful; free.

Steep learning curve:  
user needs to provide  
an interface.

Verdict

## MySQL 4.0

MySQL is one of the most popular database programs for Linux, and with good reason — it's a free, fully-fledged database server that runs well with Web servers. However, it's not for beginners, having been designed for those with extensive experience of professional databases.

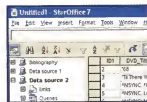
The app has a graphical interface called MySQL Control Center. Built with the Trolltech Qt toolkit, it's a separate download from <http://dev.mysql.com/downloads/mysqlcc.html>. Third party companies like StarTools also make front ends ([www.mysqlfront.de](http://www.mysqlfront.de)).

That said, almost every operation in MySQL can also be done through a command-line interface. The program also needs to be configured to handle the load expected of it

(that is, the number of simultaneous user connections), but comes with several presets for common database tasks.

The program doesn't function well as a standalone application; it requires a program that can take advantage of it, either through a direct connection to the server (StarOffice can connect directly to MySQL, for instance), or through an ODBC connection. Some functions of advanced database servers — stored procedures, for instance — aren't yet available in MySQL, but are planned for future revisions.

Most MySQL applications are Web-based, such as PHPNuke or phpBB, which run on an Apache-based Web server and use MySQL to store their data.



### Details

Contact	Intellitron
Phone	(07) 3257 3211
Online	<a href="http://www.intellitron.com.au">www.intellitron.com.au</a>
Price	\$199

Elegant data  
publishing solution.

Not suited to creating  
new databases.

Verdict

## Sun Microsystems StarOffice 7

Sun's StarOffice 7, now being touted as an inexpensive replacement for Microsoft Office, doesn't contain a distinct database application. Instead, it uses a stripped-down version of the Adabas D program (from Software AG) to connect to existing databases and publish reports from them.

This makes StarOffice much less useful than any of the other database applications in this roundup. Its main attraction is its low cost and its origins in the open source program OpenOffice.

The way StarOffice connects to data sources is reminiscent of how an ODBC connection is set up in Windows itself — by pointing to a data source and setting up a few parameters. StarOffice can use existing ODBC, JDBC, MySQL, dBase, ADO or

text-file databases. Flat-file databases such as CSV files are very slow, probably due to the lack of internal indexing, but everything else in this roundup is more reasonable. Databases can be parsed for both queries and tables.

One very nice feature of StarOffice is its wizard-like interfaces, called AutoPilots, which allow users to publish a very elegant report simply by pointing at a data source. The resulting report can either be a static file or a dynamic one: that is, it can either be a copy of the data or link directly back to it.

Unfortunately, StarOffice suffers from occasional stability problems in that it had a tendency to lock up or freeze when importing data into a report during testing.

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## Switching to DDR2

Although DDR2 runs at lower voltages and cooler temperatures than DDR1, it suffers from increased latencies. Jarrod Spiga weighs up the pros and cons and explains whether you're better off waiting for prices to drop.

Contrary to rumours, DDR2 won't run any faster than similarly-clocked DDR1 modules. So why the shift to DDR2-based platforms?

The problem with DDR1 is internal clock rates. PC3200 runs with an internal clock of 200MHz with a 2-bit prefetch (2-bits every 200MHz is equivalent to a 400MHz external clock). PC5000 runs on a 233MHz internal clock, PC3700 on a 266MHz clock, and so on. However, boosting the clock rate means voltage must also be raised. Doing this increases the amount of heat that has to be dissipated.

The most significant change to DDR2 is that the prefetch has been increased to 4-bits. This means a DDR-400 module will run with a 200MHz internal clock, while a DDR2-400 module has a 100MHz internal clock.

Ultimately, DDR2 will run at lower voltages and cooler temperatures than DDR1, but will suffer from increased latencies. Instead of timings as low as 2-2-2, the first generation of DDR2 modules will have 4-4-4 settings at best. This means programs will run slower. Data can only be written to RAM every four clock cycles instead of every two.

### AMD — LATENCY MEANS LATE

Athlon-based CPUs typically see significant performance benefits from low latency memory. So it's no surprise to see that AMD isn't rushing to jump on the DDR2 bandwagon. Firms such as OCZ and Corsair are now

producing relatively stable DDR-600 modules, so there's no need to use the more expensive DDR2 memory at this stage.

Athlon 64 (and the latest Athlon XP) processors feature onboard memory controllers. The current Socket 939 design caters for 184 pins per memory channel, while DDR2 requires 240 pins per channel. As a result, AMD boards won't feature DDR2 until the next socket redesign.

By the time DDR2-667 modules appear on the market, prices should be in line with DDR1. It's at this time that AMD will probably switch to a 1,333MHz HyperTransport/DDR2 platform.

### FLEXIBILITY AT INTEL

At Taiwan's Computex exhibition in early June, large numbers of Alderwood (i925) and Granstadale (i915) motherboards were on show. While both chipsets support DDR1 and DDR2, it's apparent that on the first generation of boards, most manufacturers will pair DDR2 with the premium i925 and DDR1 with the i915. But this could change.

This is the news upgraders want to hear. While the CPU and video card have to be upgraded with the motherboard, the RAM doesn't necessarily have to be upgraded at the same time.

Some manufacturers will probably buck the trend by making i915 boards featuring both memory slot types. The market will dictate proceedings — if initial DDR2 sales are good, expect to see the transition to DDR2 on i915 sooner rather than later.

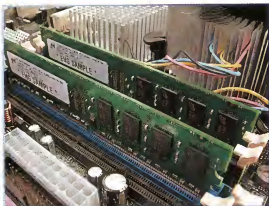
### OTHER ALTERNATIVES

SIS has announced DDR2-667 support for the SIS656, making it possible to use DDR2 with existing Socket 478 CPUs. At the time of writing, SIS hadn't set a market date for this chipset.

Not to be outdone, VIA announced the PT890 chipset back in March. The PT890 will offer DDR2 support with Socket 478, along with AGP and PCI Express x16 support. However, there's been no news about the chipset since then.

### Instant expert

- DDR2 reduces the memory internal clock, but increases latency.
- AMD won't support DDR2 for some time.
- Intel's 9xx chipsets support both memory standards.



**Looks familiar:** DDR2 looks very similar to DDR1 — only the pin count is different.

# Speed boosted Wi-Fi

Upgrading your wireless network can improve speed, but *Jarrod Spiga* warns you to beware the traps these Wi-Fi tricks can spring.

While an 802.11g network is rated for 54MB/s, you'll never see this speed. One of the main reasons is the error checking that goes on behind the scenes. Wireless networks need to be tolerant of noise around them — noise that emanates from sources such as Bluetooth devices, cordless phones and microwave ovens. Because of this, a large amount of bandwidth is dedicated to error correction, error detection and protocol overhead.

A number of tricks can be deployed to increase 802.11g's speed. Making the airwaves a b-free zone reduces overhead slightly. Using directional antennae can reduce the effects of some noise sources. Both methods offer a slight improvement without tampering with the 802.11g standard.

Wireless junkies are turning to advertised products that claim to offer, in some cases, more than 100MB/s. It's a tantalising prospect, but before forking over for the new gear it's a good idea to put these claims under the microscope.

## THE SUPER G SOLUTION

The only way you'll notice any significant boost in performance is if the channel bandwidth is increased. Super G does this in order to double transfer rates to 108MB/s.

The 802.11b standard divides the publicly useable 2.4GHz spectrum into 11 20MHz channels, each separated by 5MHz (as shown in figure A). This provides three non-interfering channels across the spectrum (channels 1, 6 and 11). A 5MHz transition band between channels guarantees they don't interfere with each other.

When Super G is enabled, a device is forced to run on channel 6 and will use 30MHz of bandwidth. As shown in figure B, the transition bands no longer exist. If other networks are running in close proximity to a Super G network, you could experience increased interference. Tests show that an insufficient spectral distance leads to performance degradation on networks running on channels 1 and 11.

If only one wireless network is running at your location, this may be fine. However, if you use a number of access points on what you consider to be non-interfering channels, beware!

## OTHER SPEED OPTIONS

As well as Super G, other products may be used for performance enhancement. All fall under the Quality of Service (QoS — 802.11e) standard, are marketed under an array of names and have no impact on other networks in the vicinity or clients on the same network.

"Packet bursting" allows a single device to send multiple frames in succession before relinquishing control of the channel. This allows bursts of information to be sent at faster rates, increasing performance. On standard Ethernet, devices will contend for channel access after each frame is transmitted.

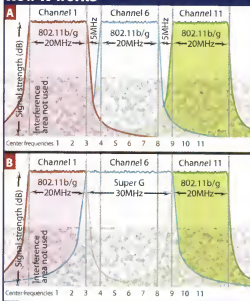
This is a non-invasive technology — if a product that supports packet bursting is communicating with one that does not, standard access contention is adopted by the packet bursting-capable device.

The other speed boosting technique that's often used is "fast frames". By using variable frame lengths to combine the data of two frames into one, the frame overhead is reduced. Again, devices that support this will default back to using standard frame sizes if the peer that is being communicated with is unable to support this feature.

## THE BOTTOM LINE

You'll only be able to take advantage of the extra features of speed boosted products if other devices on your network support them. In some cases, you'll have to stick to hardware featuring a specific type of chipset, or built by a particular manufacturer. Be wary about using these technologies — solutions such as Super G could have a detrimental effect on any wireless network in the same vicinity.

## How it works



**Changing channels:** increasing bandwidth sees Super G solutions encroaching on a "non-interfering" channels.

## Instant expert

- QoS mechanisms will only be active with compatible hardware.
- Super G may cause interference with other networks in your vicinity.

## Next month

**Notebook upgrades:** getting under the (very small) bonnet of your portable PC.

**Digital TV cards:** want TV? How to pick the best card for your PC.

## Update: PCI Express and AGP video

At the recent Computex expo, several Intel 915 (Grantsdale) motherboards were on show that featured both PCI Express x16 and AGP slots. This appears to contradict a statement previously made in Upgrade Expert (APC June, page 73) that said, "Intel won't support AGP on next-gen motherboards".

The manufacturers of the boards at the show have been innovative. In order

to incorporate both slots, they've attached the AGP slot to the PCI bus. In theory, this method offers a good upgrade solution, except that the AGP slot is forced to run at PCI speeds — a maximum of 133MB/s of bandwidth as opposed to the 2.1GB/s that AGP 8x offers. This cripples the performance of the AGP card, but is enough to throw a 2D image to the screen.

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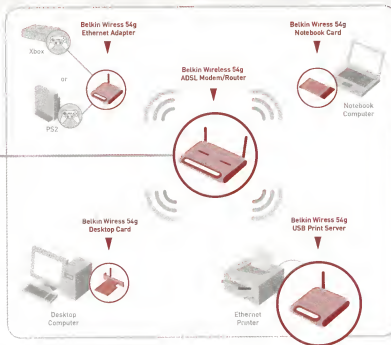


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**PC Card 802.11g adaptors**

Even if you own a laptop built before the popularisation of wireless, these PC Card adaptors will get you connected.

p88

**Four-port routers**

If you already own an ADSL modem, your best bet is a four-port router to share the connection with the entire house.

p98

**ADSL modem router**

Why bother just using a standard ADSL modem to connect one machine to a broadband connection? Turn to page 104 for a roundup of wireless modem routers.

p104

**USB 802.11g adaptors**

Now that just about every computer on the market has a USB port, compatible wireless adaptors are a painless way to share a wireless connection between several desktops or notebooks.

p91

**PCI 802.11g adaptor**

Inexpensive PCI wireless adaptors are the perfect solution for quickly adding wireless connectivity to desktop machines.

p94

# Totally wireless

**In the midst of the wireless revolution, APC rounds up the gear you need to set up a wireless network.**

There's never been a better time to jump on the wireless bandwagon. Intel is pushing enormous marketing dollars into its Centrino campaign and is focusing heavily on the wireless connectivity offered by the platform. The company has also announced wireless access points will be available on all its i9xx-based motherboards by the end of the year, making home wireless networks ubiquitous. Demand is coming from the consumer end of the market as early adopters discover the convenience of being able to surf the Internet from any room in the house.

In a business environment, the benefits of wireless are obvious. It's generally cheaper and easier to connect a small office up wirelessly than drill holes in walls and snake metres of Cat5 cable through

the workplace. It's also easier to rearrange furniture and hardware, which is important for a growing business. Wireless networking can save time, cost, and increase productivity. Workers are able to take portable notebooks or PDAs to meetings or colleagues' desks, instead of taking notes on paper and then converting them to a digital format when they return to their desks.

Unless you're on a particularly busy network, the 54Mbit/s transfer speeds offered by the 802.11g protocol should be sufficient for most small office or home environments. The speeds are ample to transfer files and surf the Internet, and while they don't quite have the bandwidth to play DVDs, it's enough for streaming compressed video.

The range of wireless gear on the market is nearly endless. This roundup focuses on 802.11g hardware: ADSL modems, access points and USB, PCI, and PC Card wireless adaptors. While APC endeavours to assemble the full gamut of contenders in each category, some companies were unable to supply products in time for testing.

Most companies offer several products within a certain category, so instead of reviewing each, this roundup focuses on the most full-featured models. For instance, many of the routers reviewed on page 98 are also available with stripped-back feature sets, excluding advanced features like USB ports or VPN server functions.

**More reviews at [apcmag.com](http://apcmag.com)**

To give you better service we have reviewed more wireless products than could fit in the pages of the magazine. Find it online at [www.apcmag.com](http://www.apcmag.com).



## PC Cards

Although you won't get the Centrino architecture's power-saving features, most notebooks come with a PC Card slot, so adding Wi-Fi support is a breeze. Nick Race compares several top contenders.

### ASUS WL-100G WLAN

Of all the options for connecting a notebook that's not Wi-Fi-enabled to a wireless network — USB, MiniPCI or PC Card (CardBus) adapters — PC Cards are by far the most popular.

And with good reason. MiniPCI adapters can be installed in some notebooks where the slot is unused and the notebook supports the installation. Not all notebooks include MiniPCI slots, and if the machine isn't designed to take a Wi-Fi adaptor in the MiniPCI slot, your options for using an antenna are limited and Wi-Fi performance will suffer. USB adapters offer significantly reduced performance when compared to the PC Card adapters tested here.

The ASUS WL-100G WLAN CardBus adaptor excels under benchmark tests, managing a solid 16Mbit/s in the medium-range test. The unit also leads the results under long-range testing, scoring 13.5Mbit/s and just beating the Micronica W54-CB to the mark. It isn't the fastest in the short-range test, but it still posts an excellent benchmark speed of 21.6Mbit/s.

This level of bandwidth is more than adequate for standard office use and Internet access, as well

as being suitable for most uses in a home network. But when it comes to transferring large files (such as video or uncompressed audio) across a wireless link, it's an exercise in patience.

Most cards of this type perform reasonably well, but are not on par with their PCI brethren — the size and orientation of the antennae being the main cause of their troubles. Whereas most PCI solutions have large attachable antennae that are positioned vertically, PC Card devices have much smaller antennae that sit parallel with the desk. Of course, it's impractical to use a notebook tilted on its side, but throughput actually does increase slightly when positioned this way.

The ASUS unit's medium and long-range results almost certainly stem from the fact it is the only card in the roundup with a vertical antenna. It flips up for enhanced Wi-Fi reception, or folds neatly into the bulk of the card for transportation.

From a security standpoint, the WL-100G features 128 WEP encryption and WPA support.

The ASUS WL-100G comes bundled with an application that lets you select from available Wi-Fi networks, as well as reporting on matters like signal strength and throughput.



#### Details

Contact	Ingram Micro
Phone	1300 653 333
Online	<a href="http://www.ingrammicro.com.au">www.ingrammicro.com.au</a>
Price	\$109
✓	Flip up antennae; excellent performance.
✗	Not the fastest over short-range.
Verdict	●●●●●

### How we tested

To gauge the performance of the devices, we used the US National Laboratory of Applied Network Research's *lperf* (<http://dast.nlanr.net/Projects/lperf>) bandwidth measuring tool on a Dell Inspiron m600 notebook running Windows XP SP1. Tests were each performed three times in three different locations: 5m from the access point in line of sight (short-range), 10m away behind glass walls and movable office partitions (medium-range), and approximately 15m away through obstructions that included office equipment, computers and people (long-range). The tests simulate typical environments to give an accurate assessment of what a user can expect from their own Wi-Fi network using each unit.

### Buying tips

When choosing a PC Card for purchase, performance is king. Try to pick one with a movable antenna or a connector for attaching an external unit. This may mean carrying a little more equipment around, but your wireless reception will improve dramatically.

A number of manufacturers, including Netgear, Linksys, Web Excel and Level One have products with channel bonding technology. This enables the card to use two Wi-Fi channels simultaneously, increasing throughput. Speed increases of up to 108Mbit/s can be had with channel bonded or "Super G"-type solutions;

however, testing has shown the boost is generally much less. Technology is often not compatible across competing brands, so consider buying all wireless gear from the same manufacturer.

Ensure the notebook you intend to use has a 32-bit CardBus slot. They are externally identical to the older PCMCIA slots, but not interchangeable. Also, check that your purchase supports the Wi-Fi network (802.11a, 802.11b or 802.11g) you plan to use. If you're unsure about this, or will often be in situations where the Wi-Fi type is unknown, choose a PC Card with a/b/g support.



## DrayTek Vigor560

DrayTek's Vigor560 is a solid but uninspiring performer, posting a short-range benchmark result of 19.6Mbit/s, 13Mbit/s at medium-range and 9.5Mbit/s at long-range. Although it doesn't break any speed records, this is fast enough for general office duties, Internet access and most home uses.



The Vigor560 is a basic unit that includes simple software support and stable drivers with network location profiling and statistics. It offers standard 128-bit WEP encryption, but doesn't support WPA or channel bonding protocols. A status LED is also present.

The Vigor560 lacks support for attaching an external antenna, a useful method for extending the range of wireless equipment. No speed boosting technologies are offered either.

At \$89, it's the second cheapest card in the roundup. While this low price point may suit the bargain hunters, the fact remains that there are faster cards on the market with fuller feature sets.

### Details

Contact DrayTek Australia

Phone (02) 9212 2838

Online [www.draytek.com.au](http://www.draytek.com.au)

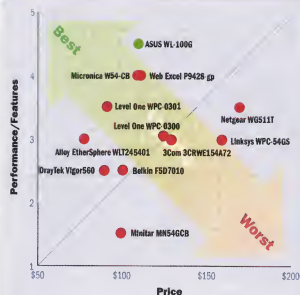
Price \$89

✓ Inexpensive.

✗ No WPA or channel bonding.

Verdict ○○○○○

## apc price-to-performance ratio



Although it doesn't provide any extra speed enhancements built-in, ASUS' WL-100G offers blistering benchmarks at all test locations. This, coupled with 128-bit WEP and WPA support enable it to get a leg up over the strong showings from Micronica and Web Excel.

## PC Card specifications

Manufacturer/ model	Alloy EtherSphere WL7245401†	DrayTek Vigor560	Level One WPC-0301	Minitar MN546CB	Belkin F5D7010 †	ASUS WL-100G WLAN	Web Excel P9428-gp	Micronica W54-CB	Level One WPC-0300†	3Com 3CRWE154A72 †	Linksys WPC-54GS†	Netgear WG511T †
Price	\$77	\$89	\$91	\$99	\$99.95	\$109	\$109	\$109	\$124	\$129	\$159	\$169
Verdict	3	2.5	3.5	1.5	2.5	4.5	4	4	3	3	3	3.5
Wi-Fi support 802.11x	b, g	b, g	b, g	b, g	b, g	b, g	b, g	b, g	b, g	a, b, g	b, g	b, g
WEP support	256-bit	128-bit	128-bit	128-bit	128-bit	128-bit	152-bit	128-bit	128-bit	128-bit	128-bit	128-bit
WPA support	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Speed enhancements	72 Turbo	No	No	No	No	No	Super G	108	Super G	108 Turbo mode	Speed booster	Super G
Short-range (Mbit/s)	14.9	19.6	22	7.2	20.9	21.6	22.6	21.9	21.8	18.5	21.1	19.9
Medium range (Mbit/s)	9.9	13	15.7	7.2	10.9	16	15.7	14	14.1	14.8	16.2	14.8
Long range (Mbit/s)	9.2	9.5	9.1	6	9.2	13.5	11.3	13.4	8.9	7.8	5.3	9.9

† See [apcmag.com](http://apcmag.com) for full review.

## Level One WPC-0301

Level One's WPC-0301 is a quality piece of hardware with excellent performance but no support for channel bonding or any other bells and whistles. This makes it well suited to a power user looking for no-nonsense connectivity.

Although the WPC-0301 scores second highest in short-range testing and equal first in medium-range, it's let down by an average result in the long-range test.



Driver support for the card is good, featuring a small bar graph in the system tray for monitoring signal strength. This comes in handy if you're frequently on the move and it's a welcome feature in a card designed specifically for notebooks. The unit supports WPA encryption for added security, which is good considering WEP is only supported at 128-bit.

Test results confirm that the WPC-0301 is best suited to those working in close proximity to an access point. If that sounds like you, and you're looking for a simple PC Card adaptor with solid driver support, look no further.

### Details

Contact	Level One
Phone	(02) 9648 5822
Online	www.levelone.com.au
Price	\$91

✓ Solid short-range; inexpensive.

✗ Slow at long-range.

Verdict ●●●●○

## Micronica W54-CB

The Micronica W54-CB card is a solid contender, performing admirably in short-range testing where it achieves second place with an average throughput of 21.9Mbit/s, just behind the Web Excel P9428-gp. In medium-range tests, the Micronica unit manages a sustained transfer of 14Mbit/s, representing good throughput for a wireless network at this distance, although it's not the quickest in this roundup.



Where the unit really comes into its own, however, is in the consistency of its results; it is less prone than most of its competitors to speed fluctuations caused by environmental factors. This is particularly evident in long-range tests.

Although the W54-CB offers no support for extended 802.11g services like Super G, it performs well at regular 802.11g speeds.

The Micronica card ships with basic software that enables the user to scan for new networks, profile network connections and monitor Wi-Fi reception and throughput. Support for 128-bit WEP security and WPA round out the feature set nicely.

### Details

Contact	Micronica
Phone	(03) 9699 8844
Online	www.micronica.com.au
Price	\$109

✓ Consistent speeds.

✗ No channel bonding option.

Verdict ●●●●○

## Minitar MN54GCB

Minitar's card is by far the slowest performer in the roundup, taking the wooden spoon by a considerable margin in both the short and medium-range tests and averaging just 7.2Mbit/s over both distances. It fares slightly better in the long-range test, scoring 6Mbit/s, just edging out the Linksys WPC-54GS to avoid last place.

But while it performs poorly, the Minitar is feature-rich. It ships with a reasonable software package that takes care of network searching, profiling and settings management as well as monitoring



throughput. Minitar is also one of the few manufacturers to offer a unified driver set for PC Card, USB card and PCI card products. This is a boon to a system administrator rolling out support to a number of different machines.

The card ships with support for WPA and 128-bit WEP encryption and the MN54GCB can also operate as an access point, providing DHCP functionality to the rest of the network. However, it can't be recommended due to its poor performance.

### Details

Contact	PC Range
Phone	1800 201 202
Online	www.pcrange.com.au
Price	\$99

✓ Good software package.

✗ Poor throughput.

Verdict ●○○○○

## Web Excel P9428-gp

Though the Web Excel P9428-gp scores the highest throughput in short-range testing, pushing almost 170MB over the link in the 60-second test period at a rate of 22.6Mbit/s, it lags behind the ASUS in the medium and long-range tests. The transfer rate drops to

15.7Mbit/s at medium-range, placing it equal third, and 11.3Mbit/s at long-range (third). While not the top scores, these results are still respectable.

Some simple software is bundled with the card to scan for available networks and create profiles for frequently-used networks. Like many cards in this roundup, this device lacks the capacity to attach an external antenna.

The Web Excel features 152-bit WEP encryption, but no support for WPA. Super G is supported, though this functionality wasn't specifically tested. There have been reports of Super G equipment not working effectively with competitors' products, so if you're after this feature, make sure that you buy hardware from a single vendor.



### Details

Contact	Protac
Phone	(02) 8748 8888
Online	www.protac.com.au
Price	\$109

✓ Good performance.

✗ Slightly slower at long range.

Verdict ●●●●○



# USB Wi-Fi adapters

If you're thinking of setting up a wireless network and need to swap the adaptor between several different computers, USB is the simplest way to go. Nick Race sorts the wheat from the chaff.

## Netgear WG121

While the USB 1.1 interface doesn't provide for enough throughput to adequately handle 802.11g data transfer rates, USB 2.0 offers more than enough bandwidth to connect 54Mbit Wi-Fi adaptors without suffering any speed loss.

APC's testing confirms that the performance of USB Wi-Fi adaptors trails the PCI and PC Card adaptors by a country mile, though ease of use and compatibility are strong points. The great advantage of the USB Wi-Fi adaptor is that it can be connected to both notebook and desktop PC systems and can easily be swapped between computers when required.

A range of form factors exists for USB Wi-Fi adaptors that takes in everything from USB key-sized "thumb"-style units up to the larger dish-shaped models which also appear in this roundup. Some were provided with plain USB extension cables and others with docking bay-style extensions.

Measuring 10.5 x 8.5 x 2cm, the Netgear WG121 adaptor is one of the largest units in this roundup. However, its relative thinness means it should slip comfortably into a notebook bag without adding too much bulk, and at 83g it's hardly a back-breaker.

The performance of the device in testing is excellent. The WG121 averages 14.6Mbit/s at close-range, the highest result of all the USB products. At medium-range it manages 13.1Mbit/s, which is an

excellent score. At long-range, the Netgear unit clocks a 7.7Mbit/s average transfer rate. Once again, this is a great result and more than adequate for general office use.

The WG121 connects with a standard USB A to B cable, which is supplied. The device is powered by the host, so no other cables or adaptors are required. The signal strength changes noticeably when the small foldaway antenna is raised or lowered, indicating that the antenna should be kept upright for maximum performance.

Installation and set up of the device is straightforward. The bundled drivers include a software package that helps you locate and connect to available networks. The software can also be used in a passive mode, where Windows Wireless Networking takes care of the connection, and the smart wizard monitors the connection and provides useful information such as performance graphs and signal strength. The WG121 supports 128-bit WEP encryption, as well as the strong WPA security standard.

The Netgear WG121 is moderately priced and a strong performer. If you're in the market for a USB Wi-Fi adaptor, look no further.



### Details

Contact	Netgear Australia
Phone	1800 502 061
Online	<a href="http://www.netgear.com.au">www.netgear.com.au</a>
Price	\$149
✓	Excellent long-range transfer; good software package.
✗	Small antenna.
Verdict	●●●●●

### Buying tips

USB Wi-Fi adaptors are handy if a number of PCs or notebooks need to be temporarily connected to a network. Of course, you'll need one adaptor for every machine that will be connected simultaneously.

When choosing a USB adaptor to pair with a notebook, bear in mind that they tend to be quite large.

And remember that USB solutions don't match the performance and throughput of PCI and PC Card adaptors. If you don't need to share

a single Wi-Fi adaptor between a few machines, stick with a PC Card device for notebooks or PCI for desktops.

USB adaptors vary enormously in the type and size of antennae used. Though choosing a small unit makes sense for those who need to carry the adaptor around with a notebook, they sometimes suffer from lower throughput thanks to the limited size available for the antenna. As a general rule of thumb, go for a device with as large an antenna as you can tolerate.

### How we tested

All units were tested using Iperf 1.7.0 from the Distributed Applications Support team at the US National Laboratory for Applied Network Research (<http://dast.nlanr.net>).

The default TCP/IP test was run three times at 60 seconds each, then the results were averaged. Testing was carried out at three points through the APC offices: at short-range, within line of site of the WAP (around 5m); at medium-range, through glass walls and partitions (10m); and at long-range, through glass, concrete walls and partitions (15m).

## 3Com OfficeConnect 3CRWE254G72

The 3Com OfficeConnect's unique fold-up design attempts to address one of the inherent problems of USB keys, as it enables the user to align the antenna vertically. However, this can be problematic — users with side-mounted USB ports may find the adaptor gets in the way when typing. The unit ships with solid driver support, and installing and using the adaptor is problem-free.



The 3Com achieves scores of 9.8Mbit/s, 8.2Mbit/s and 2.3Mbit/s at short-, medium- and long-ranges respectively. These results aren't spectacular, but are adequate for most office applications and Internet surfing.

Security implementation is one of the 3Com device's strong points. It supports both 128-bit WEP and WPA, making it ideal for a business network environment where close proximity to the access point can be ensured.

No extension cable is supplied, but its hinged design helps overcome this omission.

### Details

Contact	3Com
Phone	1800 678 515
Online	<a href="http://ap.3com.com">http://ap.3com.com</a>
Price	\$109
✓	Compact design.
✗	Poor performance.
Verdict	●●●○

## Alloy WLU2454

The Alloy WLU2454 is the only impressive thumb-style device in the roundup. Measuring just 9 x 1 x 2.5cm, it's certainly small enough to slip into a pocket for easy transportation. The unit also ships with a cover to protect the USB interface and a neck strap.

The WLU2454 squeezes an average of 13.8Mbit/s at short-range. Interestingly, the unit manages 16.3Mbit/s at medium-range, exceeding its own short-range score. In contrast, the adaptor only manages 4.1Mbit/s in long-range tests. However, this is still adequate for office duties or Internet surfing.



A standard set of drivers and a complete software package for finding Wi-Fi networks and setting WEP keys and different profiles based on your location are supplied. The bundled Envara Configuration Utility monitors the device, graphing performance and throughput — a handy feature. Full 256-bit WEP encryption and WPA are both supported.

A USB cable with attached cradle allows the device to stand upright, maximising performance of the adaptor's internal antenna.

### Details

Contact	Alloy Computer Products
Phone	(03) 8562 9000
Online	<a href="http://www.alloy.com.au">www.alloy.com.au</a>
Price	\$121
✓	Small; good software.
✗	Slow at long-range.
Verdict	●●●○

## Level One WNC-0300USB

Measuring 8 x 1.5 x 4cm, the Level One WNC-0300USB is the smallest of the standalone-style USB adaptors. A supplied 1.5m USB-to-mini USB cable is required to connect the device; useful when positioning it to ensure good signal strength. However, as there's no way to mount the unit vertically, performance at longer ranges suffers.

The drivers are stable during testing, and the bundled software offers network searching, profiling and connection monitoring.

When minimised, the software sits in the system tray, showing the current network reception.

This is a handy tool for those hopping from desk to desk. Support for both 128-bit WEP encryption and the WPA standard are available.

Performance is good at short- and medium-range distances, notching up 12.3Mbit/s and 8.2Mbit/s respectively. This indicates acceptable performance in an office environment where proximity to the access point can be ensured. But performance falls short at the long-range distance, achieving just 3Mbit/s. This is due to its flat-to-the-desk design, which prevents the antenna from broadcasting effectively.



### Details

Contact	Tecksel
Phone	(02) 9648 5822
Online	<a href="http://www.level1.com.au">www.level1.com.au</a>
Price	\$169
✓	Small; lightweight.
✗	Poor performance; expensive.
Verdict	●●●○

## Linksys WUSB54GP

The Linksys WUSB54GP's design is somewhere between a thumb-style device and a standalone unit. It incorporates a fold-out antenna which fits closely to the side of the unit when not in use. While not as compact as the other thumb-style devices in this roundup, the WUSB54GP still measures just 11.4 x 3.2 x 1cm when the antenna is folded in and fits comfortably in a notebook bag. The unit also swivels up and down to stand perpendicular to the USB port. A USB cradle is also bundled.



The WUSB54GP achieves 13.8Mbit/s in short-range testing, equal with the Alloy unit. It scores 13.1Mbit/s at medium-range, showing a minimal drop in throughput with the added distance. A respectable 7.2Mbit/s is achieved in the long-range test.

The driver application shows basic information on the signal strength and link quality. It also supports searching for and connecting to available networks. A profile manager is included to minimise reconfiguration when switching between networks.

Support for 128-bit WEP encryption is available, though WPA is not.

### Details

Contact	Linksys Australia
Phone	1800 678 808
Online	<a href="http://www.linksys.com">www.linksys.com</a>
Price	\$159
✓	Extendable antenna; good software package.
✗	Fragile.
Verdict	●●●○

## Minitar MN54GU

The Minitar MN54GU has a unique design which tends to topple over when the wire is moved around. Fortunately, it ships with a base plate designed to reduce this tendency.

The unit uses a unified driver set shared with the PC Card and PCI card adaptors. This is handy for administrators or users rolling out a single vendor solution to keep support issues down. The bundled

software provides functionality for searching networks and connection profiles as well as offering details on throughput and signal strength. Set up and configuration is a breeze, and once the software is installed, the adaptor is identified and installed automatically.

Racking up scores of 10Mbit/s, 6.7Mbit/s and 7.2Mbit/s in the short-, medium- and

long-range tests respectively, the Minitar isn't a star performer. Support for both 128-bit WEP and WPA encryption are offered.

Using the provided USB A to B cable for connection, the MN54GU skirts the boundaries of being practically portable. Although quite a bulky unit due to its thickness, the Minitar should fit in most notebook bags next to a full-size mouse.



### Details

Contact PC Range

Phone 1800 201 202

Online [www.pcrange.com.au](http://www.pcrange.com.au)

Price \$99

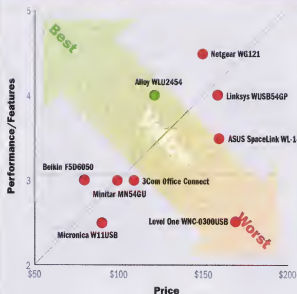
✓ Unified driver set; inexpensive.

✗ Bulky; unstable.

Verdict



## apc price-to-performance ratio



The Netgear unit offers impressive benchmark scores, with 128-bit WEP and WPA support, and is a shoo-in for the Editor's Choice award. Alloy's WL2454 isn't far behind though, and adds 256-bit WEP support to take out the Best Value award.

## USB Wi-Fi adaptor specifications

Manufacturer/ model	Beilin F5D6050†	Micronica W11USB†	Minitar MN54GU	3Com OfficeConnect 3CRWE254G72	Alloy WL2454	Netgear WG121	Linksys WUSB54GP	ASUS SpaceLink WL-140	Level One WNC 0300USB
Price	\$79.95	\$90	\$99	\$109	\$121	\$149	\$159	\$159	\$169
Verdict	3	2.5	3	3	4	4.5	4	3.5	2.5
Wi-Fi support 802.11s	b	b	b, g	b, g	b, g	b, g	b, g	b	b, g
WEP support	128-bit	128-bit	128-bit	128-bit	256-bit	128-bit	128-bit	128-bit	128-bit
WPA support	No	No	Yes	Yes	Yes	Yes	No	No	Yes
Short-range (Mbit/s)	5.3	4.7	10	9.8	13.8	14.6	13.8	5	12.3
Medium-range (Mbit/s)	3.8	4	6.7	8.2	16.3	13.1	13.1	5	8.2
Long-range (Mbit/s)	3.8	3.6	7.2	2.3	4.1	7.7	7.2	4.7	3

† Reviews can be found online at [www.apcmag.com](http://www.apcmag.com).





## PCI wireless adaptors

Portable PCs aren't the only systems that can go wireless. Any of these PCI cards will eliminate that network cable from the back of your desktop workhorse. *Jarrold Spiga* rounds up 10 contenders.

### Gigabyte GN-WPEAG

Even though the marketing hype for wireless networks has been centred around portable computing, there's no reason why your desktop machine can't be connected wirelessly.

The 802.11g standard has seen real world transfer rates that are double the speed of first-generation Ethernet, making Wi-Fi speedy enough for everything but the largest of file transfers.

There's also the convenience factor. While you

don't move your desktop

PC around as much as a laptop,

wireless networks allow you to place a number of computers in different rooms without having unsightly cables strewn all over the house.

Not all PCI cards are alike. WPA support, the level of WEP encryption, and the type of speed boosting technology support all come into play, along with the inclusion of — and support for — different types of antennae. Another differentiator is driver implementation. Manufacturers such as Netgear ship their own setup software that makes configuration easy, but does this have an adverse affect on performance?

If the need for speed weren't so great, 802.11b products would be fine. This is the prime reason the Gigabyte GN-WPEAG gets the Editor's Choice

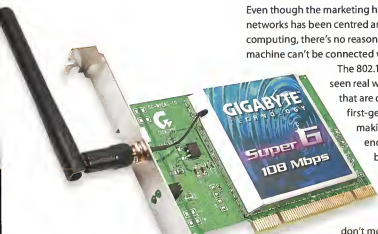
award in this category. An average transfer rate in excess of 22Mbit/s at medium-range (10m away) as well as top performance at long-range (15m away, with lots of interference) shows that this card can handle noisy situations with minimal drama.

While the Gigabyte isn't the best performer in direct line-of-sight applications, most users will be happy to put up with this since they'll still be able to transfer data at a healthy 20.1Mbit/s. Best of all, large amounts of CPU resources aren't consumed when achieving these raw speeds.

One curious result to emerge from testing indicates that the further away you are from the access point, the lower the strain on system resources. This is ideal for gamers who prefer to keep as many CPU cycles up their sleeve as possible for top gaming performance.

The GN-WPEAG adaptor is packed with useful features, offering 152-bit WEP encryption, WPA support and Super G speed enhancements. With the price of some 802.11g PCI cards as high as \$176, the Gigabyte's \$99 price tag is also a welcome surprise, as the device doesn't skimp on any of the features or performance of the more expensive cards.

Due to space constraints, not every PCI adaptor tested in this roundup is featured here. However, you can find full reviews of the Belkin F5D7000AU, Micronica W54-PCI, Netgear WG311 and D-Link DWL-G520 cards on the APC Web site at [www.apcmag.com](http://www.apcmag.com).



#### Details

Contact Rectron

Phone (02) 9748 7725

Online [www.rectron.com.au](http://www.rectron.com.au)

Price \$99

✓ Obstructed performance; Super G; WEP key length.

✗ Short-range performance.

Verdict ●●●●●

#### How we tested

Each PCI card was installed in a Shuttle ST61G4 case alongside a Pentium 4 2.8GHz processor and 512MB of PC3200 DDR memory. Three one-minute Iperf data transfer tests were run involving the same methodology used to test both the USB and PC Card adaptors.

Because desktop systems are much more likely to be used for tasks which exert pressure on the processor, such as gaming and video compression, CPU usage was also measured during data transfers. This result identifies which cards have efficient chipsets and which rely more heavily on the CPU.

#### Buying tips

There aren't that many differences between most 802.11g PCI cards, but make sure you select one that meets your needs.

If you're connecting to a business network, look for a card featuring WPA. If you need to transfer large amounts of data and need more bandwidth, look for Super G-enabled hardware (but beware, this may affect other networks in your vicinity — see "Upgrade Expert", page 84).

Lastly, check that the card supports your system. Some cards don't ship with a complete driver set, so you could have trouble getting the card to work under Windows 98 or Linux.

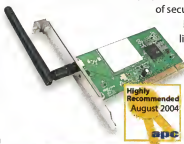
## Alloy WLT2454VP

The Alloy WLT2454VP's standout feature is its support for 256-bit WEP keys. It's unlikely anyone would actually relish entering keys of that length, let alone remember them, but as WPA becomes easier to adopt and is implemented on a much broader base, it makes sense to ramp up the key length to offer the best level of security possible.

It performs best when it isn't in line-of-sight of the access point. A data transfer rate of 15.5Mbit/s is achieved at medium-range, while a decent 7.7Mbit/s is measured at long-range. It also supports the Atheros chipset-based Super G acceleration, which gives an extra boost to performance on compatible networks.

The standard antenna plugs into an SMA connector, and a single link LED is present on the back of the card.

About the only negative aspect of this card is that it consumes more CPU resources than all other cards in the roundup. All up, the Alloy card is a great performer at a low price.



### Details

Contact Alloy

Phone (03) 8562 9000

Online [www.alloy.com.au](http://www.alloy.com.au)

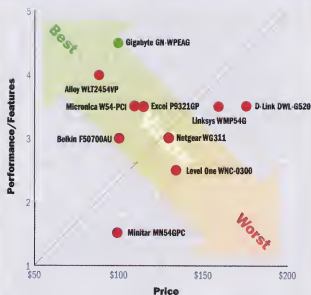
Price \$88

✓ Super G; WEP key length.

✗ CPU usage.

Verdict ●●●●○

## apc price-to-performance ratio



Although it isn't the fastest unit in short-range tests, the Gigabyte GN-WPEAG is the best performer at long-range. Its support for Super G and 152-bit WEP keys are also compelling, but the low price tag is the icing on the cake.

## PCI wireless adaptor specifications

Manufacturer/ model	Alloy WLT2454VP	Minitar MNS4GPC	Belkin FS0700DAU†	Gigabyte GN-WPEAG	Micronica WS4-PCI†	Excel P9321GP	Netgear WG311†	Level One WNC-0300	Linksys WMP54G	D-Link DWL-6520†
Price	\$88	\$99	\$99	\$99	\$109	\$114	\$129	\$134	\$159	\$176
Verdict	4	1.5	3	4.5	3.5	3.5	3	2.5	3.5	3.5
WEP encryption (bits)	256	128	128	152	128	152	128	128	128	128
WPA	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Speed enhancements	Super G	None	None	Super G	Super G	Super G	Super G	Super G	SpeedBoost	Super G
Short-range transfer (MB, 3mins)	454	460	390	433	465	502	456	475	475	494
Average transfer rate (Mbit/s)	21.2	21.4	18.2	20.2	21.7	23.4	21.2	22.1	22.1	22.4
CPU utilisation (%)	13.12	6.67	5.69	7.61	7.87	9.06	9.04	8.62	6.6	9.63
Medium-range transfer (MB, 3mins)	332	330	380	472	228	235	96	227	241	461
Average transfer rate (Mbit/s)	15.5	15.4	16.8	22	10.7	10.9	4.5	10.6	11.3	21.5
CPU utilisation (%)	10.14	5.12	5.63	7.99	3.92	4.36	4.92	5.25	3.59	8.04
Long-range transfer (MB, 3mins)	165	88	202	263.5	154	128	129	114	161	130
Average transfer rate (Mbit/s)	7.7	4.1	9.4	12.3	7.2	6	6	5.3	7.5	6
CPU utilisation (%)	5.96	1.83	3.59	2.73	2.55	2.77	2.34	2.43	2.27	2.79

† Reviews can be found online at [www.apcmag.com](http://www.apcmag.com).

## Excel P9321GP

The unadorned appearance of the Excel P9321GP is somewhat misleading as it performs very well, especially at short-range.

At the short-range, a total of 502MB was transferred at three one-minute intervals, equating to a 23.4Mbit/s — far and away the quickest result in all tests. But almost 10% of CPU resources are consumed during this process, suggesting that the card relies on the CPU to achieve these speeds.

Put the Excel P9321GP in a noisier environment, however, and performance tapers off. The medium-range result of 10.9Mbit/s puts the card back in the middle of the pack.

Super G compliance is bundled, allowing even faster throughput rates. The longest WEP key supported is 152-bits, attempting to make up for the fact that the device doesn't support WPA — its only significant downfall. Although WPA offers the best security — and is highly recommended for a home or small business network — the reality is that cracking a 152-bit WEP key is extremely time-consuming.



### Details

Contact	Protac
Phone	(02) 8748 8888
Online	www.protac.com.au
Price	\$134

✓ Short-range performance; Super G compliant.

✗ No WPA support.

Verdict ●●●○

## Level One WNC-0300

The WNC-0300 performs extremely well in line-of-sight tests, returning a generous 22.1Mbit/s. However, once you move the device further away and place some obstructions between it and the access point, the throughput struggles to reach even 10Mbit/s.

The CPU usage of the card is nothing to boast about either. Even as the WNC-0300 struggles to meet 802.11b speeds at medium-range, 5.25% of clock cycles are used. The data transfer at this location is the worst bar one, while CPU utilisation is average.

Ultimately, these factors give the WNC-0300 the second worst performance rating.

This card's saving grace is its comprehensive feature set. Included are support for both WPA and Super G speed boosting techniques. Support for regular 128-bit WEP keys are also included.

As a footnote, Level One also supplied APC with its non-Super G-enabled PCI card (WNC-0301) for testing. This card performs very well in benchmarking but, unfortunately, space constraints mean that only the most feature-rich product in the range is reviewed here.



### Details

Contact	Tecksel Australia
Phone	(02) 9648 5822
Online	www.level1.com.au
Price	\$134

✓ Close-in performance; Super G-compliant.

✗ CPU usage.

Verdict ●●●○

## Linksys WMP54G

The Linksys WMP54G PCI card offers the best overall performance regardless of the environment the card is used in. It's also extremely friendly to the CPU, draining only 6.6% of resources when delivering the maximum measured throughput of 22.1Mbit/s at short-range.

The reason for this energy-efficient performance lies in the antenna. It's significantly larger than the others in this roundup, and connects to an SMA plug on the back of the card. The extra gain it provides means that the card can differentiate

signal from noise more easily, reducing the amount of error detection and correction that the CPU has to perform.

However, you do pay a premium for this performance. At \$159, it's the second most expensive card listed here and doesn't support Super G speed enhancements. Instead, Linksys's proprietary SpeedBoost technology is used to supply fast frame and frame bursting optimisations to transfers.

Support for the WPA standard is provided, along with support for WEP encryption keys up to 128-bits in length.



### Details

Contact	Linksys
Phone	1800 678 808
Online	www.linksys.com.au
Price	\$159

✓ Overall performance; CPU usage.

✗ No Super G support.

Verdict ●●●○

## Minitar MN54GPC

Like the Linksys adaptor, Minitar's MN54GPC also stands out because of its antenna. Instead of being mounted on the back of the card, the MN54GPC features a standalone antenna which can be mounted on the desk or your PC. While it's a novel idea, the cable is only 55cm long, which is just too short to reach the top of a desk if the PC is sitting on the floor. A longer cable would allow more flexible installation.

This configuration gives the MN54GPC reasonable

performance when close to the access point. But when the going gets tough, the data rate drops, with the long-range test yielding a lowly 4.1Mbit/s.

There are other features missing from the MN54GPC. There's no speed boosting technology support, so you'll be stuck at regular G speeds. WEP keys of 128-bit are supported, but that's the bare minimum anyone would accept in today's climate of security paranoia. When you factor in the lack of WPA support, you're left with a run-of-the-mill card at best.



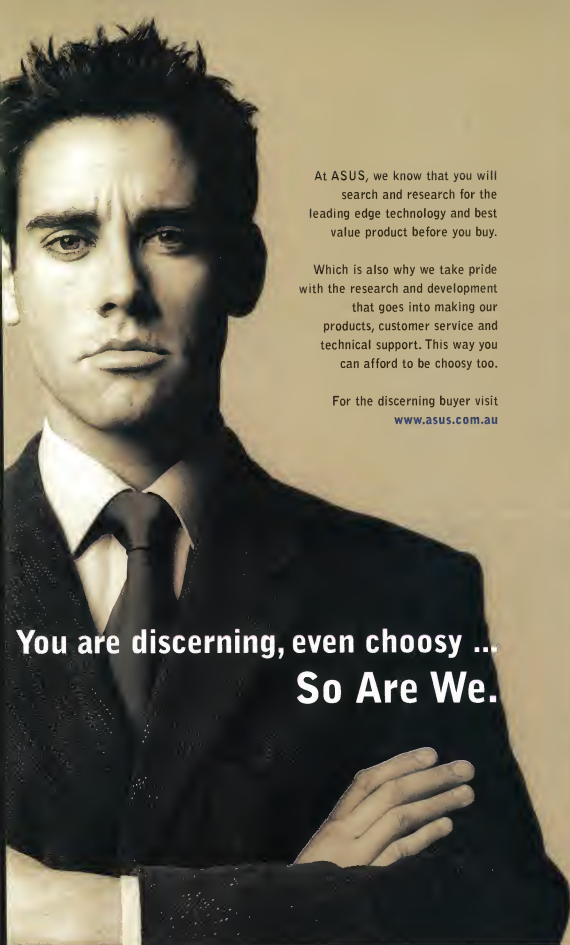
### Details

Contact	PC Range
Phone	1800 201 202
Online	www.pcrange.com.au
Price	\$99

✓ Desktop antenna.

✗ Low data rate when obstructed; minimal features.

Verdict ●●○○○



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## Four-port wireless routers

Combining a wireless router with a four-port switch is a convenient way to aggregate two networking infrastructure tools. Jarrod Spiga tests a selection of the latest devices.

### ASUS WL500g



Four-port wireless routers offer the best of both the wired and wireless worlds. These devices are perfect for home or small business environments, and offer an all-in-one internal networking solution, whether you're connected to the Internet or not.

All of the products in this roundup feature DHCP, integrated firewall, NAT, port-forwarding and logging features. WEP keys as large as 152-bit are starting to appear on some wireless adaptors, but all of the routers here support 128-bit WEP encryption, except the Gigabyte unit. However, a number of these routers support wireless protected access (WPA) — a rolling-key security feature aimed at small businesses with a RADIUS server.

A number of features make the ASUS WL500g stand out from the crowd. From the box, the device is preconfigured so that the wireless and wired networks are totally separate.

Firewall rules are configurable for each network to enable different levels of access for wired and wireless clients. However, as this type of operation may not suit everyone, with little more than four mouse clicks, the router can be reconfigured to run like any other device in the roundup.

A USB port usually appears on the back of a wireless router to share a USB printer. ASUS has incorporated this functionality into the WL500g, along with the ability to plug in USB portable storage devices or a Webcam. When the latter is plugged in, the router generates HTML-based Webcam pages and can send emails when movement is detected, making it useful for monitoring a specific location. When a USB storage device is plugged in, the files on the device become accessible via the FTP protocol.

The ASUS unit lacks SNMP support and any form of speed-boosting technology — it only offers vanilla 802.11g. However, even at the furthest testing distance, transfer rates in excess of 11Mbit/s were achieved in testing.

The removable antenna is attached to an SMA plug, allowing you to connect a more powerful version if required.

Although the WL500g doesn't feature the Super G support found in the Level One's WBR-3405TX, it ships with a printer port, a bound manual, and matches the WBR-3405TX feature-for-feature in every other regard.

Due to space constraints, not all devices tested in this roundup are featured here. Reviews of the remaining products can be found on the APC Web site — [www.apcmag.com](http://www.apcmag.com).



#### Details

Contact	Ingram Micro
Phone	1300 654 613
Online	<a href="http://www.ingrammicro.com.au">www.ingrammicro.com.au</a>
Price	\$169
✓	Price; solid DMZ; secure.
✗	No SNMP.
Verdict	●●●●●

### How we tested

In order to conduct the wireless performance testing, each device was set up at the same three locations within the APC Labs. The device was connected to an AMD Athlon 2800+ based system running Iperf Server. To achieve fair and equal testing, the lowest common denominator was adhered to and the four-port device was configured so that any speed-boosting technologies were disabled. All units were configured to use channel 8, which was kept free throughout testing to eliminate the possibility of

interference from speed-boosting techniques that may have been adopted by any other access points within range. WEP was disabled in order to reduce packet overhead.

The client system consisted of a Pentium 4 2.8GHz processor paired with 512MB of PC3200 DDR memory. These were housed within a Shuttle ST61G4 case, along with a Netgear WG311 PCI wireless network card.

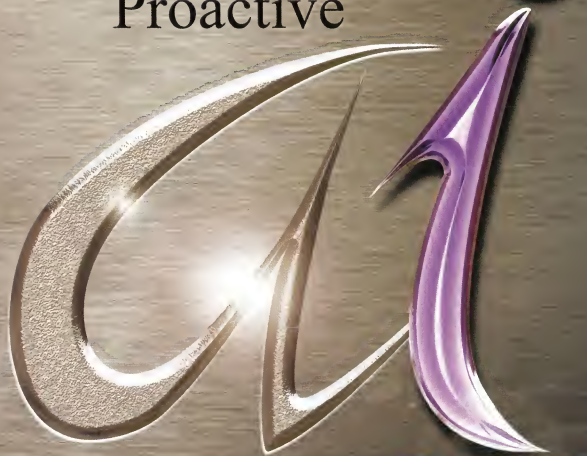
The Iperf application floods the network interface with data, and then

measures how much data is transferred in a given time period.

At each testing location, data transfer was tested over three separate one-minute intervals and the results averaged. The short-range location was situated approximately 10m away and within direct line of sight of the test device. At medium-range, the signal had to travel through two walls for a total distance of 20m. At the long-range it had to pass through a 50cm-thick concrete block and two walls, over a total distance of 30m.



# Proactive



## ASUS Intelligence Everywhere



### P5AD2 Premium

- Intel 925X/ICH6R
- Dual-DDR2 533
- PCI Express
- WiFi-g onboard
- Triple RAID
- Dual Gbit LAN
- 1394b



### P5GD2 Premium

- Intel 915P/ICH6R
- Dual-DDR2 533
- PCI Express
- WiFi-g onboard
- Triple RAID
- Dual Gbit LAN
- 1394b



### P5GDC-V Deluxe

- Intel 915G/ICH6R
- Intel Graphics Media Accelerator 900
- Dual-DDR2 533 and Dual-DDR 400
- PCI Express
- Dual RAID
- 1 x Gbit LAN
- 1394a



### P5GD1

- Intel 915P/ICH6R
- Dual-DDR 400
- PCI Express
- Dual RAID
- 1 x Gbit LAN

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## Belkin F5D7230au4

Belkin's F5D7230au4 carries a similar price tag to the ASUS WL500g. While not offering the same amount of features, its performance is satisfying, provided that its relatively low range is not a concern.

At short-range, a constant 20Mbit/s is reached. Add a bit of interference and this figure drops to a respectable 16.5Mbit/s, making the Belkin unit the best in the roundup for access near the router. However, the high transfer rates stop when the router attempts to communicate through a wall. An average of 6.7Mbit/s at long-range indicates

that it doesn't handle low-signal communications well.

The unit lacks WPA support along with any speed boosting technology. Dynamic DNS and SNMP support are also missing. Going some way toward offsetting these omissions, the Belkin's notable saving graces come in the form of its lifetime warranty and comprehensive instruction guides.

A stateful and NAT-based firewall is also included, with a simple, wizard-based setup application that helps make this device a wise choice for beginners.



Details	
Contact	Belkin
Phone	1800 666 040
Online	www.belkin.com.au
Price	\$180
✓	Close-in performance.
✗	No WPA, Dynamic DNS or SNMP.
Verdict	●●●○

## Level One WBR-3405TX

Aimed at the business market, Level One's WBR-3405TX is a feature-packed bundle that comes in at under \$300. Hardly any home users utilise the RIP routing protocol at present, but the WBR-3405TX supports it. SNMP and WPA capabilities are also included, making this device suitable for any office environment.

The device is Super G-compliant and has a fine Web management interface. It features the best dynamic DNS support of all units tested. Instead of selecting from two or three predefined

providers, you can configure the WBR-3405TX to update any DNS server that supports dynamic updates.

It also provides the most consistent performance in the roundup, regardless of signal level, interference or distance. At short-range, its transfer rate stays at a healthy 20.5Mbit/s. Even at the long-range test location, over 12Mbit/s of throughput is achieved — the best at this range. The antenna is removable and connects to an SMA plug.

However, the WBR-3405TX lacks both a print-serving capability and a printed manual.



Details	
Contact	Tecksel Australia
Phone	(02) 9648 5822
Online	www.level1.com.au
Price	\$299
✓	Overall performance; Super G.
✗	No printed guides or print-serving capability.
Verdict	●●●●○

## Micronica SOHOmate WiP-500

Web interfaces are supposed to make devices easy to configure. However, the Micronica SOHOmate WiP-500's interface is entirely devoid of graphics, text isn't formatted, and options aren't easy to find, assuming they're labelled correctly. This makes it an extremely difficult product to configure.

The device has only the most basic features — DDNS (through three online providers), SNMP, Virtual-DMZ and WPA are all supported, although UPnP is not. It will also share compatible USB and parallel printers.

The Micronica's wireless interface reveals inconsistent performance. At short-range, an average 18.2Mbit/s is achieved. At medium-range, the transfer rate plummets to 8.9Mbit/s but increases to 12Mbit/s at long-range. The router doesn't support any methods for increasing transfer speeds beyond the 802.11g specification.

Considering that the SOHOmate WiP-500 comes with a \$325 price tag, better performance and ease of use is expected: even if that means skimping on one or two of the fancier features.



Details	
Contact	Micronica
Phone	(03) 9699 8844
Online	www.micronica.com.au
Price	\$325
✓	Print server capabilities.
✗	Poor interface; no UPnP; price.
Verdict	●●●○

## Minitar MN54G4R

The Minitar MN54G4R boasts the best short-range performance in this roundup — in line-of-sight conditions, it achieves a blisteringly fast data-transfer rate of 20.8Mbit/s. However, once obstructions are added, that rate drops considerably — down to 7.3Mbit/s at the long-range location.

Unfortunately, antennae replacement isn't a solution to this issue as both antennae on the MN54G4R are fixed to the device. There's no support for any speed-boosting technologies, so you'll be forced to live with its slow transfer rates.

A USB port is provided for sharing a printer with the network, as long as your printer is compatible with the device.

The MN54G4R lacks SNMP support, but is WPA-compliant. DDNS configuration is inflexible — you're forced to use the DynDNS.org (<http://dyndns.org>) service. A full set of user manuals is supplied with the device and its Web interface is easy to use, but security is weak — you only need to enter the password to make changes to the router configuration. A basic SPI-based NAT filter is also included.



Details	
Contact	PC Range
Phone	1800 201 202
Online	www.pcrange.com.au
Price	\$199
✓	USB print server.
✗	No SNMP; basic security.
Verdict	●●●○



#### First Notebook with TV Tuner and Subwoofer

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## Netgear WGT634U

Netgear's WGT634U is the most expensive product of this bunch, but has a feature set matched only by the ASUS unit. Plug in a USB storage device and you'll be able to access data stored on it via FTP or Windows-based file sharing.

The WGT634U isn't the best performer at short-range, providing a data transfer rate of only 17.5Mbit/s. However, add typical obstacles into the mix and the WGT634U starts to show its true colours. Moving to the medium-range sees a minuscule drop in performance to 16Mbit/s. Pushing the client out to long-range sees the data transfer rate drop to a fraction below 10Mbit/s. If you can activate Super G, you'll get better performance again.

Like many Netgear products, this router is designed with usability in mind. Setting up features such as WPA, SNMP, DDNS, forwarding of single or a range of ports, and limited DMZs are simple using the logically arranged Web GUI.

A printed manual isn't included, but is included on the CD in PDF format.



### Details

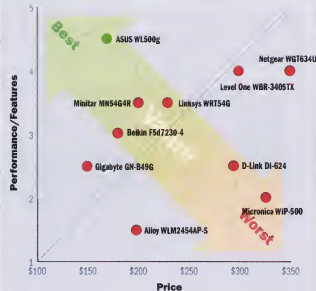
Contact	Netgear
Phone	1800 502 061
Online	www.netgear.com.au
Price	\$349

✓ Super G; USB file sharing.

✗ Expensive.

Verdict ●●●●○

## apc price-to-performance ratio



ASUS' WL500g offers stellar benchmark results at all three test locations, plus the ability to share printers, Webcams and USB hard disks or memory keys via the adaptor. There are no speed-baasting technologies, but DMZ support and WEP/WPA-based security help to make the WL500g stand out.

## Four-port router specifications

Model	Gigabyte GN-B49G†	ASUS WL500g	Belkin F5D7230-4	Alloy WLM2454AP-S†	Minitar MN54G4R	Linksys WRT54G†	D-Link DI-624†	Level One WBR-3405TX	Micronica WIP-500	Netgear WGT634U
Price	\$149	\$169	\$180	\$198	\$199	\$229	\$294	\$299	\$325	\$349
Verdict	2.5	4.5	3	1.5	3.5	3.5	2.5	4	2	4
WEP encryption (bits)	152	128	128	128	128	128	128	128	128	128
WPA	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Speed enhancements	Super G	None	None	None	None	Speed booster	Super G	Super G	None	Super G
USB function	None	File/Webcam/Printer sharing	None	None	Printer sharing	None	None	None	Printer sharing	File sharing
Print server	No	Yes (with LPT port)	No	No	Yes (USB only)	No	No	No	Yes (with LPT port)	No
Dynamic DNS providers supported	4	2	None	3	1	2	3	Manual*	3	2
UPnP	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
SNMP	No	No	No	No	No	No	No	Yes	Yes	Yes
DMZ support	Virtual**	Full	Virtual**	None	Virtual**	None	Virtual**	Virtual**	Virtual**	Virtual**
Antennae	1x SMA	1x SMA	2x attached	1x SMA	2x attached	2x coaxial	1x SMA	1x SMA	1x SMA	1x attached
Short-range Avg transfer rate (Mbit/s)	20.5	19.6	18.5	20.5	20.8	16.4	21.7	20.5	18.2	17.5
Medium-range Avg transfer rate (Mbit/s)	17.9	16.1	46.5	9.2	13	14	12.1	14.9	8.9	16
Long-range Avg transfer rate (Mbit/s)	4.1	11.4	6.7	6.4	7.3	5.4	8.4	12.5	12.1	10

\* Manual configuration of Dynamic DNS is supported. \*\* The term "Virtual DMZ" is used by vendors to describe a situation in which a PC appears to be connected directly to the Internet and is not behind the NAT gateway; it should be noted, however, that this is NOT a DMZ by definition. † See apcmag.com for full review.



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 Intel® 855 Chipset  
 Microsoft® Windows® XP Home/Professional  
 ATI 9600 Pro Graphics Chip  
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## ADSL modems

With different wireless standards and security becoming a critical factor, how do you choose the right ADSL modem/router for your needs? Simon Johnson puts five products to the test.

### DrayTek Vigor2600G



Many small business users are finding combined ADSL modem/router devices invaluable as they consolidate a lot of hardware into a single component. In the business environment, it means network admins can essentially throw out the print server, ADSL modem, firewall and router and replace it with one unit. While this can save the average small business a lot of money in both support and maintenance

costs, it does, however, mean you've got all your eggs in one basket.

To say that the DrayTek Vigor2600G is a feature-packed unit is an understatement. It has everything you could ever want in an ADSL modem and wireless router. Configuration is a breeze using the quick Internet setup option, which automatically detects DSL settings.

The user interface is divided into four logical areas: basic setup, quick setup, advanced setup and system management. Using quick setup, beginners can get up and running in seconds. However, the interface lacks documentation, and while PDF materials are provided on the CD, a help button on each menu would be preferable.

The wireless LAN can be configured quickly to hide the SSID, change the channel numbers and configure WPA, as well as to filter MAC addresses. Advanced settings that you would normally expect to find on a more commercially-oriented router, such as dynamic DNS, DMZ, VLAN and RADIUS configuration are also included.

Small business users will find the features of the 2600G invaluable. For instance, where the business has two offices, you can connect their two private networks together over the Internet using a VPN. The use of the IPSEC (IKE) standard provides a strong level of security to protect your information.

It's also possible to choose between DES, 3DES and AES to encrypt the information passing through the device. In theory, there shouldn't be any problems with setting this up as a part of a VPN to talk to a commercial firewall product such as CheckPoint Firewall-1.

The 2600G can be managed using SNMP or VPN, and can also send information to a system log or send alerts via email. It also contains a full set of diagnostic tools so users can see everything from routing tables, NAT firewall redirection and active sessions.

If you're a power user, a small business, or you are wanting to run an inexpensive and secure VPN, you won't go too far wrong with the Vigor2600G.



#### Details

Contact DrayTek Australia

Phone (02) 9212 2838

Online [www.DrayTek.com.au](http://www.DrayTek.com.au)

Price \$429

✓ Feature packed; high level of security; VPN server.

✗ Quick start guide difficult to read.

Verdict ●●●●●

### How we tested

Each ADSL modem was tested using a Pentium 4 Toshiba notebook running Windows XP with a Linksys Wireless-G notebook adaptor installed. The wireless LAN was tested from three locations. The short- and medium-range locations had clear line of sight to the device and were 1m and 5m from the ADSL modem. The long-range location was in an adjoining room approximately 6m away from the PC.

Each wireless router was set to download a 2.6MB antivirus software update directly from the ISP. This provided a fair throughput test, while minimising the effects of Internet traffic.

### Buying tips

You have several choices when it comes to connecting to the Internet wirelessly using ADSL: either using a separate wireless router and ADSL modem, or an all-in-one device.

For home users, an all-in-one device can save money and space. A wireless LAN also enables Net surfing from any room in the house, and you can use a VPN to work from home. It negates the need for Cat5 cable.

If you're making the change from a dialup or cable modem to an ADSL

modem, you will need a line filter to separate your phone line from your ADSL line.

New wireless users often forget to configure their security properly. You should change the default password from "admin" to a phrase (not a dictionary word), and don't use WEP.

For home use, consider purchasing an 802.11g device that uses WPA-PSK, MAC address filtering, enables you to hide your SSID, and includes an SPI or NAT firewall (turned on).

#### ASUS Flagship Notebook

The ASUS L5DF is a brilliant amalgamation of experience, industry know-how and technical excellence in making the perfect notebook. It is the first notebook to utilise the leading edge AMD K8 mobile processor. The L5DF also features the ASUS AceView Technology that enhances the visual effect of the LCD screen for wide view angle and advanced colour-contrast enhancements.

ASUS recommends Microsoft® Windows® XP Professional

## MASTERING THE RULES OF VISUAL PERFECTION

# ASUS L5DF



AMD Athlon 64-M Mobile K8 Processor 3000+  
Microsoft® Windows® XP Home/Professional  
ATI 9600 Pro graphics chip with 128M external VRAM  
15" TFT Display with ASUS AceView Technology  
Built-in MiniPCI 802.11b/g with antenna  
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## 3Com OfficeConnect 3CRWE754G72-A

The OfficeConnect router requires you to enter every little bit of information from your ISP, including VPI and VCI details, which is annoying. If this information isn't entered, the device will stop working and start dropping packets on the WLAN.

A DHCP server is included, as are options to choose a Wi-Fi channel, hide the SSID and select the wireless mode. WPA-PSK,

128-bit WEP and WPA (with a RADIUS server) are offered for encryption.

You can also prevent specific MAC addresses from connecting to the device. The OfficeConnect also allows you to modify router tables, view Internet settings and manage the device using SNMP.

The built-in firewall has a number of easily-installed rules for popular applications. An impressive client filter allows you to configure the device to apply specific rules at different times of the day; handy if you've got kids.

Configuration info can also be saved to a file on your PC, saving a lot of time reconfiguring the router after a firmware upgrade.



### Details

Contact	3Com
Phone	1800 678 515
Online	<a href="http://ap.3com.com">http://ap.3com.com</a>
Price	\$311

✓ Enables you to save the configuration to your PC.

✗ No auto-detection of ISP details.

Verdict ●●●○

## A versus B versus G

One question many buyers face when establishing a wireless network is what type of network adaptor to buy.

While fast, the 802.11a standard has only managed to grab a foothold in the enterprise space, since components tend to be expensive and have relatively short ranges. Its successor, the 802.11b standard, has been popular in home and small business environments for a couple of years, but is gradually being edged out as 802.11g begins to get a foothold.

Both 802.11b and 802.11g protocols operate in the 2.4GHz frequency band, and running b and g networks in the same physical space can lead to interference problems. See Upgrade Expert on page 85 for more information. Operating at a maximum speed of 54Mbit/s, however, 802.11g offers a substantial boost over the 11Mbit/s transfer rate provided by 802.11b hardware.

Hardware operating at a whopping 108Mbit/s has recently arrived on the market and uses channel bonding and expansion to double the theoretical transfer rate over 802.11g equipment. Testing shows that the transfer rate is closer to 1.2 to 1.5 times the speed of conventional 802.11g hardware.

While this has its uses in real time streaming of video, voice over IP and high-traffic LAN/WANs, the new high-speed equipment especially benefits power users in a home environment. Small businesses may see some benefits in terms of transferring data internally, but it's hardly worth replacing an entire 54Mbit 802.11g network with a 108Mbit one for slightly faster transfer rates.

Watch this space for further developments.

## Belkin F5D7630au4A

The Belkin router works straight from the box. Windows XP sees the SSID as "belkin54g" and picks up a 192.168.2.2 address from the DHCP server. This isn't a standard address, but the LAN settings are easily changed.

The Web configuration user interface looks very similar to the 3Com's and is divided into LAN Settings, Internet WAN, Wireless, Firewall and Utilities. It enables you to save the settings, view a security log and select popular apps to add to the NAT firewall. As

with most of the routers, you can disable the SSID, use WPA-PSK with or without RADIUS, as well as 64- or 128-bit WEP. MAC address filtering can also be enabled.

The unit feels quite warm to the touch after just a few minutes' use. And, while the Belkin is inexpensive, it lacks some of the polish of the DrayTek and Billion products. It doesn't support a printer or ship with a line filter, but this is hardly lamentable for power users with existing network hardware. The small LEDs on its front panel are difficult to see from a distance, but again, this won't be much of a concern.



### Details

Contact	Belkin
Phone	1800 666 040
Online	<a href="http://www.belkin.com/anz">www.belkin.com/anz</a>
Price	\$299.95

✓ Good manual; good value.

✗ No line filter or printer server.

Verdict ●●●○

## Billion BIPAC-7500G

Billion's 7500G impresses right from the start with a comprehensive set of cables, including a console cable and a line filter.

The Web-based configuration interface contains the usual LAN, WLAN, device statistics and a quick start menu. Like the DrayTek, the Billion has an autoscan feature that scans your ADSL connection for different settings. It finds both the PPPoA and PPPoE PVC on 8/35 with no trouble at all.



Firewall security is disabled by default, and even when it's enabled, intrusion detection is still turned off. Once you turn everything on, however, security is impressive. The rules-based packet filter allows URL, keyword and domain name filtering. Java applets and IP addresses may also be blocked.

The wireless security component supports WPA with TKIP or 64/128-bit WEP. You can hide the SSID, as well as use MAC address filtering. It also includes QoS, virtual servers and VPN support using PPTP, IPsec and L2TP, and its user management function is useful for remote access and control.

### Details

Contact	Billion
Phone	1800 201 202
Online	<a href="http://www.billion.com.au">www.billion.com.au</a>
Price	\$369

✓ Includes an ADSL line filter; auto detects ADSL settings.

✗ Default security settings are very weak.

Verdict ●●●○



#### Value and Quality

The ASUS A25H is a notebook that proves value and quality as one. Featuring a 15" screen and a DVD-RW combo, the ASUS A25H is a robust notebook equipped with amazing features and a mesmerising price.

ASUS recommends Microsoft® Windows® XP Professional

# PRICED TO MESMERISE

## ASUS A25H



Intel® Pentium® 4 Processor 520  
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## Level One WBR-3402A

The Level One is the undisputed rogue of the pack. Consisting of white text on a grey background, its Web-based user interface is hard to read, but also difficult to work with, as the browser screen is refreshed approximately every three seconds.

Its biggest failing is in wired security. It discloses sensitive information about its status without you logging in, including IP addresses, subnet, gateway, DNS, ADSL upstream/downstream speeds, and even WAN statistics.

Configuration is also difficult, requiring extensive networking knowledge. The CD-based user manual is of no help here, either.

Conversely, its wireless security is good. Protocols include 802.1x, WPA-PSK, WPA (RADIUS) and 64- to 256-bit WEP. The SSID can be hidden and MAC addresses filtered. A DMZ, virtual servers, packet filtering, domain filters and URL blocking are also offered.

Advanced Settings give you the option to view standard log information, back up the firewall to a file on your PC, as well as to provide a MAC address to engage the Wake-on-LAN function.



### Details

Contact Tecksel

Phone (02) 9648 5822

Online www.level1.com.au

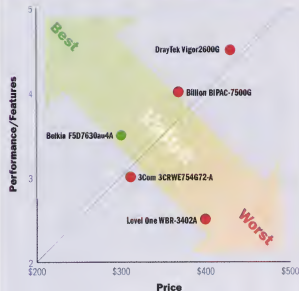
Price \$399

✓ Supports a wide range of encryption algorithms.

✗ Discloses IP address information without having to enter a password.

Verdict ●●●○○

## apc price-to-performance ratio



Provided you can live without the built-in print server and line filter, Belkin's entry offers outstanding value for money. That said, if performance and features are king, the DrayTek Vigor2600G offers enough for power users to put it ahead of the crowd.

## ADSL modem specifications

Manufacturer/Model	Belkin F5D7630v4A	3Com OfficeConnect 3CRWE754672-A	Billion BIPAC-7500G	Level One WBR-3402A	DrayTek Vigor2600G
Price	\$299.95	\$311	\$369	\$399	\$429
Ethernet ports	4	4	4	4	4
Number of antennas	2	2	2	1	2
Power-on/off switch	No	No	Yes	No	Yes
Print server	No	No	No	USB	USB
Automatic ISDN backup	No	No	No	No	Yes
Remote dial-in	No	No	No	No	Yes
Web-based interface	Yes	Yes	Yes	Yes	Yes
Command line interface (telnet)	No	No	No	No	Yes
Syslog	No	No	No	Yes	Yes
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI
Supports hidden SSID	Yes	Yes	Yes	Yes	Yes
WPA/PSK	Yes	Yes	Yes	Yes	Yes
MAC access control	Yes	Yes	Yes	Yes	Yes
URL filtering	Yes	Yes	Yes	Yes	Yes
VPN server	No	No	Yes	No	Yes
WEP encryption (bits)	128	128	128	256	128





# Surfing the airwaves

**James Bannan explains how, with a little care, setting up a wireless network under Windows is a quick and painless affair.**

Only Windows XP and 2003 Server have native support for the 802.11 protocol. The Wireless Zero Configuration Service, active by default on both OSes, automatically detects and configures wireless adaptors. But enabling other versions requires extra software and a few more steps.

## INSTALLING YOUR ADAPTOR

### 1 Check drivers

Make sure you have the correct drivers for your adaptor. Normally, they come with the hardware, but check online to see if an update is available.

### 2 Connect adaptor and install client utility

After plugging in a device, Windows detects the presence of new hardware and attempts to locate its driver, so have the driver package available. For any version other than XP you'll need to install a client utility such as RoamAbout or Aironet. To ensure stability, especially with Windows 98 and Me, install the utility before installing the adaptor.

Client utilities often come with quite a few tools and diagnostics, so even if you're using XP it's worth installing them to get the extra functionality.

### 3 Creating a wireless profile

Windows 98, Me and 2000 require a wireless profile within the client utility to communicate. They can't automatically configure available wireless networks, so they need to be told how to communicate. A profile consists of a name, the type of connection (access point or peer-to-peer), and the name of the available network. If the network requires Wireless Encryption Protocol (WEP) encryption, the WEP key will need to be entered. You may also be asked to configure a power profile, and whether the IP address is renewed whenever the configuration profile is selected. This is recommended.

### 4 Configuring WEP

WEP encrypts wireless traffic using a cipher based on a key, generally a passphrase. You don't need to know the passphrase, but you do need the key, usually either alphanumeric or hexadecimal. While some networks automatically assign the WEP key, you'll need to enter it manually. For all versions of Windows other than XP, the WEP key has to be entered when configuring the wireless profile. There will generally be an option to enable encryption/authentication on the connection, and then the key is entered.

Rather than automatically connecting to a network without WEP, XP asks for user confirmation.

## 5 Configuring power and transmit settings

Laptop users need to tweak power and transmit settings. In Windows XP:

- Right-click on the wireless network icon in the system tray and select Status;
- Select Properties in the pop-up status window;
- Under the window which displays the adaptor information, click Configure;
- Select the Advanced tab.

There are a number of options in this window, such as Station Name, Channel, Transmit Rate and Card Power Management (some adaptors may have other options). Click on Transmit Rate and look at the options. If your card has Auto Rate capabilities, it will negotiate with all available access points to find one at the specified rate — high, medium or standard. Otherwise, a "Fixed" setting is used. The lower the setting, the less power used (at the expense of speed).

Card power management only has two values — on or off. In XP, you can change this setting in the Configure window but other versions rely on the wireless profile configuration. Enabling card power management is advised; if the machine goes into standby or hibernation, the card is also taken offline, but will be powered on again when the machine resumes operation. This is especially important for Windows 98 and Me, where PC Cards will not turn on again unless the machine is rebooted.

## PREFERRED NETWORKS

If you connect wirelessly to different networks, you won't want to configure your adaptor every time you switch. Windows XP remembers the settings once you have configured a network.

Go into Properties and select the Wireless Networking tab. There are two windows, Available networks and Preferred networks. The latter should show a list of all the networks the machine has ever successfully connected to. If there are more networks you know about that aren't listed, you can add them. When wireless is enabled, Windows attempts to connect to the first network listed, then works down the list until an available network is found. **IT19**

## Skill level

### Intermediate

Basic knowledge of Windows OS and Windows networking.

## Requirements

• Any Windows-based machine (preferably Windows 98 or higher) • Wireless adaptor.

## Time to complete

15-20 minutes (approx)

## Inside info

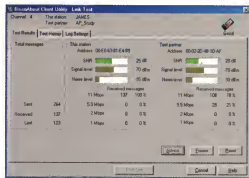
■ Wireless tools package information

[www.hpl.hp.com/personal/Jean\\_Tourrilhes/Linux/Tools.html](http://www.hpl.hp.com/personal/Jean_Tourrilhes/Linux/Tools.html)

■ NdisWrapper information  
<http://ndiswrapper.sourceforge.net>

■ Prism54 Modules  
[www.prim54.com](http://www.prim54.com)

■ Ethernet — a popular network protocol analyser  
[www.ethereal.com](http://www.ethereal.com)



**When in room:** all versions of Windows except XP require the installation of a client utility such as RoamAbout.



Fedora has a GUI tool called system-config-network for configuring network adaptors.

Here you can select options such as Activate device when computer starts and Allow all users to enable and disable the device as preferred.

More importantly, this is where you can set the device to obtain IP address settings via DHCP or set a static IP address.

Fedora uses the file /etc/sysconfig/network-scripts/ifcfg-<interface> to store these settings so they're loaded automatically when the network is started.

In this case, /etc/sysconfig/network-scripts/ifcfg-wlan0 is used. These settings can also be configured using ifconfig.

Using the same GUI tool (system-config-network), go to the Wireless Settings tab. Set the Mode (Auto, Ad-hoc or Managed), SSID, Channel, Transmit Rate and WEP encryption key.

Again, all of these settings are stored in /etc/sysconfig/network-scripts/ifcfg-<interface> so they'll be automatically loaded when the network service starts.

Activate the device in the GUI or type:

```
ifup <interface>
```

Alternatively, use iwconfig from the Wireless tools package. This command is equivalent to ifconfig; however, iwconfig is dedicated to configuring wireless adaptors. This command can be used to set both basic and advanced wireless parameters. Keep in mind that when the network is next started it will revert to the settings saved in /etc/sysconfig/network-scripts/ifcfg-<interface>.

To set the operating mode of the device type:

```
iwconfig <interface> mode < mode type>
```

The mode type can be left as Auto, or manually set as Managed or Ad-hoc.

Ad-hoc mode relates to a network of only one cell, with no Access Point.

Managed mode refers to a network which:

- is composed of many cells or;
- has at least one Access Point.

To set the Transmit Rate (bit rate) type:

```
iwconfig <interface> rate <rate>
```

To set a more advanced setting, such as Transmit Power, type:

```
iwconfig <interface> txpower <transmit power>
```

Where iwconfig deals with generic settings for any wireless network adaptor, iwpriv can be used to manipulate the particular settings and parameters for the driver specific to your device. For more details on the iwconfig command, type:

```
man iwconfig
```

At this point, the adaptor should be correctly installed and configured.

## SEARCHING FOR NETWORKS

To search for available Access Points, use:

```
iwlist <interface> scan
```

This helps find information such as the ESSID, which is referred to in the GUI under Wireless Settings as Network name (SSID). The ESSID is the identifying name of a wireless network. By setting this parameter, you automatically attempt to connect to that particular network. You may need more settings to connect successfully, such as a WEP encryption key.

The iwlist command can be used to display lots of other information about a wireless network interface, some of which is not displayed by iwconfig, such as the list of available frequencies and the number of defined channels.

To do this, type:

```
iwlist <interface> freq / chan
```

## WEP KEYS

To set a WEP encryption key (which may be required to connect to your wireless network), either use the system-config-network GUI tool or add KEY=<WEP encryption key> to the /etc/sysconfig/network-scripts/ifcfg-<interface> file.

Alternatively, type:

```
iwconfig <interface> key <WEP encryption key>
```

## TEST TIME

Network settings are now complete, so it's time to test the network.

To restart the wireless adaptor, type:

```
ifdown <interface> ; ifup <interface>
```

If the adaptor is set to automatically obtain an IP address using DHCP, it will be assigned all IP settings.

To check network information such as the IP address, type:

```
ifconfig <interface>
```

To check wireless-specific information such as the ESSID, mode and transfer rate (bit rate), type:

```
iwconfig <interface>
```

You can test the wireless network further using basic tools such as ping. If things aren't working as planned, some good places to look for troubleshooting information are:

- output from dmesg; or
- /var/log/messages.

Implementing WPA is much easier if you have a Linux host on your network. A number of free RADIUS servers are available for Linux, including FreeRADIUS ([www.freeradius.org](http://www.freeradius.org)). Advanced users may want to investigate this further to secure networks more effectively. ■■■■



**4** A WEP encryption key may be required to connect to your wireless network. There are two ways to activate a WEP key.



**5** You can test the wireless network using basic tools such as ping. If things aren't working as planned, check dmesg or /var/log/messages.



## We are the robots

They pack an x86 chip and a hard drive and can fetch you a beer or even protect your house. *Simon Sharwood introduces the PCBot.*



Standing a little under a metre tall, Wilson has wheels instead of feet, infra-red sensors and a Webcam instead of eyes, a USB hub for lungs and a laptop computer doing duty as his heart and brain.

Wilson is, of course, a robot. However, Wilson is no ordinary robot. He's a PCBot, one of an emerging breed based on personal computers that are bringing autonomous robots with sight, vision and speech within the reach of anyone who can type their credit card number into a Web page, connect a USB device or click on a GUI.

No longer the stuff of science fiction, personal robots are evolving via the PC into cutting-edge toys accessible to personal computer owners everywhere. Vendors are tweaking and tuning components for PCBot kits, creating an army of crawling machines that are part pet, part personal servant.

### INTRICATE INSIDES

Robotics has fascinated hobbyists for years but has been dominated by enthusiasts willing to hand-code software for control boards powered by elderly CPUs, then linking them to peripherals that offer the ability to help a robot see, hear and interact with the world.

Building such beasts requires not only a dab hand with a soldering iron, but the ability to wade neck-deep in programming code. It's a combination that's made robotics the province of electronics hobbyists and hard-core coders, rather than something computing enthusiasts found accessible.

The PC, however, started to carve out a useful robotics role in the late 1990s, led by Lego's Mindstorm product. Mindstorm uses a friendly, GUI-driven Windows client to program the behaviour of its 'bots, which attracted considerable attention from schools due to its enticing \$299 price tag.



**Bot brain:** this 17cm Mini-ITX motherboard is the catalyst for the new PC 'bots.

Mindstorm's brain is a proprietary micro-controller that leaves it reliant on a small pool of peripherals

and limits I/O options, restrictions which became a common complaint among robot enthusiasts and researchers. Embedded Java eased this problem and found its way into various CPU boards to enhance the PC's role as a robot controller, but the PC remained an enabling tool for robotics rather than its core.

Mini-ITX changed all that. Made by Taiwanese company VIA Technologies, it's a 170 x 170mm motherboard that packs the company's x86 compatible C3 CPU plus USB 2.0, FireWire, audio and video into a \$300 package.

The C3 boasts clock speeds of up to 1.2GHz and, best of all, it runs without fans and has miserly power requirements, qualities that have made it a favourite in the case modding community. (Among the projects listed at [www.mini-itx.com](http://www.mini-itx.com) you'll find a complete server nestled into a gingerbread

## Bot building basics

## WHAT DO YOU NEED TO BUILD A PCBOT?

The Open Automaton Project offers a full bill of materials at <http://oap.sourceforge.net/prototype.php>. This guide also outlines a few of the components you'll need to get started.

## ARMS

A robot needs arms to pick up objects. They are nearly always optional extras, so prepare to splash more cash. If the arm you choose can rotate as well as grip, you get better flexibility.

## PC

PCs with low power requirements are a must, making Mini-ITX or Pentium M systems strong favourites. Don't go below 1GHz or your 'bot will be too slow. Onboard Wi-Fi is essential. If you want your 'bot to be a rolling jukebox, give it plenty of storage with a nice big laptop hard drive. Optical drives are all very well, but a plain old reader will be more useful. Do you really think you'll want to burn CDs on the move?

## BASE

A base of some sort is an essential item for any 'bot unless you want the PC to drag along the ground.

## FRAME

Choosing a reconfigurable frame adds flexibility for the inevitable future decision to enhance your robot.

## WHEELS

The number of wheels is up to you, but one or more that can swivel adds agility. If the Daleks' inability climb stairs has always bothered you, exterminate wheels and go for treads or legs instead.

## MOTOR AND BATTERY

Your robot probably doesn't need to move quickly, so choosing a low power and moderate motor means you can also use a battery that's lighter and cheaper.

## SENSORS

A 'bot needs sensors before it can become autonomous. Infra-red and sonar sensors can help your machine navigate small obstacles. A Webcam will allow object recognition and make your 'bot a useful cyber sentry. Elevating the Webcam is helpful, as is a pan/tilt mechanism so you can direct your robot's gaze.

village.) Researchers and hobbyists alike have recognised its potential to power smarter and better-connected 'bots than ever before.

Mini-ITX removed robot manufacturers' worries about the size of a PC and its power consumption. "When we introduced Mini-ITX, we got all sorts of enquiries from the robotics community, which has been very interested in x86-based robots," says

Tim Brown, manager of VIA's Robotics Program. "We started following up [their enquiries]," he continues. "Now we have 30 PCBot projects around the world and a support program that helps would-be PCBot companies bring their products to market."

## MEET CENTIBOT

Those projects start with the Centibots project conducted by Stanford Research Institute (SRI), an experiment to create 100 autonomous robots that can act in concert to map an area, identify an object of value, and then retrieve it. The robots share a self-contained Wi-Fi network and work together to build up a map of the area they inhabit, warn each other of

threats such as intruders, and exchange information so that if one robot fails another can replace it.

The Centibots use off-the-shelf robot chassis from US-based company ActivMedia ([www.mobilerobots.com](http://www.mobilerobots.com)) that include sensors to give them autonomous navigation abilities. But to take their abilities up a notch,

SRI replaced their control circuits with PCs powered by Linux and Mini-ITX motherboards, a strategy which not only gave them a low-cost route to bigger onboard brains but also cut costs by allowing the use of off-the-shelf Wi-Fi kits for

communications between the 'bots.

"It was cheaper to buy a mass-produced board than to build one," Brown says. "And that's the main benefit about moving robotics to the x86 architecture. You get more powerful processors, a vast range of peripherals that can be connected using very common standards, and a much more user-friendly developer environment with a much wider user base."

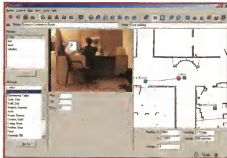
The robotics industry is responding positively to VIA's ideas. By year's end, at least

two new 'bots will be on sale with PCs humming at their hearts and average consumers as their target market. Several open source projects are hard at work on control software or suggested lists of components for aspiring 'bot builders

## BRAIN LIKE A LAPTOP

For those hoping to hop straight into PCBots, Wilson shows how easy it can be to get under way. Wilson is based on the ER1, an off-the-shelf 'bot sold by US company Evolution Robotics.

ER1 ships as a series of aluminium beams that can be assembled into a variety of shapes. ▶



**Roaming tech:** onboard cameras and wireless networking make it possible to remotely monitor and control PC 'bots.

**Personal robots are evolving via the PC into an army of machines that are part pet, part servant**



► the most common of which is a small trolley that allows a laptop to fold open so the screen becomes its "face."

The unit plugs into a USB port to drive the motor, includes a battery and rolls about on three wheels. A pole serves as a mount for optional accessories such as additional sensors or a gripping arm strong enough to carry a can of drink.

The jewel in ERI's crown is Evolution Robotics' software, which allows users to build complex series of [if-then] statements that instruct the robot how to behave. The simplicity of the (Windows-only) GUI makes ERI impressively user-friendly.

## Robot combat

PCs make 'bots better, but few PCs have a chance to survive Robowars, Australia's grassroots Robot Combat league that pits weapon-toting radio controlled robots against each other in fights to the death.

Robowars is organised by Melbourne resident Brett Paulin and staged Australia's first Robot Combat event in December 2003. Several 'bots battled for supremacy at the inaugural event and the group's Web site ([www.robowars.org](http://www.robowars.org)) lists over 20 local 'bot-building teams.

The site also has hints and tips galore on how to build a battle 'bot, plus a very useful Drill Hacking 101 tutorial that teaches how to make a weapon using a drill and other parts available from hardware stores.

The 'bots can also be modded. "We added an obstacle avoidance camera, then a gooseneck at the back with a trailer so Wilson could carry objects," said Michael Walker, maths, science and robotics teacher at Wilson's home in Orbst Secondary College in rural Victoria. "Before you knew it, we had something that looked like a Mars rover."

The next purchase was a USB hub, then a Wi-Fi system so that Wilson could be remotely controlled from a desktop PC. Extensive experimentation and programming means the 'bot now roams freely through the school, making a 200m journey from classroom to library, where it identifies the librarian, articulates its request for a book, and navigates a safe return path.

Melbourne's Cameron Sanderson is another ERI owner and has taught his 'bot, Buster, to "look up the weather forecast on the Internet when I ask it to and then read it out loud". This feat uses the ERI's voice recognition system, the wireless network access card on the notebook, and some C++ Sanderson wrote to "grab the weather information from a HTML page".

Orbst College's students have also personalised Wilson by teaching it to recognise individual voices. "They were keen to have a personal response," Walker says. "They wanted to turn it into something more than a machine."

## ROBOT ASSISTANT

This desire to personalise and humanise has been carried over into two PCBots that will soon roll off the production line.

Milo, a forthcoming commercially available PCBot from US company RoboDynamics, will not look out of place in a stylish home, which is where the firm's CEO, Fred Nikgohar, believes it belongs.

"We are bringing in the world's first robotic personal assistant," says Nikgohar. "It will wake you up in the morning, tell you you're out of bread, tell you to pick up your kids at three."

Milo also plays your CDs after you tell it which one you want to hear, courtesy of Windows XP's speech recognition features. The 'bot can even fire up its copy of Outlook and use your contacts database for voice-activated soft phone calls over its Wi-Fi link. Personal butler, substitute pet — the 'botmakers have got you covered.

White Box Robotics' 912 robot also happily takes on home duties. The company's manager, Thomas J. Burick, has taught one to recognise pages in children's books and "read" them to his nieces and nephews. "The kids go



**They won't bite:** White Box Robotics president Thomas J. Burick has 'bots read to his nieces and nephews.

crazy and the robot becomes their best friend," he says.

Both 912 and Milo can become home sentries, an application where the PC's communications capabilities shine.

"The robot can contact you via your mobile phone if it detects loud noises when you are out," Burick boasts. An onboard Web server then allows owners to use "tale-presence" to see and hear what the robot sees.

"[All you need to do is] jump on a terminal at work to access the robot," Burick says. "Guide it using the arrow keys so you can see the things you want to see."

RoboDynamics' Nikgohar has similar applications in mind for Milo. "A robot has far more complex sensors than a human and never gets bored or sick," he says, with an eye on industrial security customers as well as those dissatisfied with conventional burglar alarms.

The burgeoning PCBot community also caters to those interested in taking them beyond pre-packaged 'bots. Dafydd Walter's Open Automaton Project, for example, is 100% open source, and uses other GPL projects such as Player/Stage (<http://playerstage.sourceforge.net>) and Orocos ([www.orocos.org](http://www.orocos.org)).

Australian vendors such as RobotOz ([www.robotoz.com.au](http://www.robotoz.com.au)) offer products like the Lynxmotion 5 Axis Robotic Arm Kit, an arm controllable from the COM port of a PC. Higher-level efforts to create PC-based standards are even under way, courtesy of the Robotics Engineering task Force ([www robo-ef.org](http://www robo-ef.org)), a group populated by Intel staffers and modelled on the Internet Engineering Task Force.

But don't be fooled by the lure of PCBots — for many it's pure fantasy. "I just watched *Star Wars* too many times and I had the idea to build a robot in the back of my head for years," says RoboDynamics' Nikgohar. "Now the timing is right to make robots a reality." **ET**

# FIGHT NIGHT

Inspector General

Ball Peen

Lawn Mower

Blade

COMING SOON!

PC v Mac

Ultimate Botbot

## Meet the family

PCBots and other robots with significant levels of PC componentry or heritage are becoming increasingly popular. Here's a short guide to some of the more prominent and accessible members of the robot family.



### Lego Mindstorms



**Maker:** Lego.

**Specs:** Powered by a proprietary "RCX microcomputer" with an undisclosed CPU, Lego's grandly-named Robotics Invention System beams commands up to eight metres from a PC to drive its robots by infra-red.

**Programming environment:** "RCX" code, a proprietary language coded via a Windows-only client.

**Good for:** Building a 'bot in an hour with no fuss – sensors and motors are right there in the box.

**Cost:** \$299.

**Shop at:** Large toy shops; [www.lego.com](http://www.lego.com).

### ER1



**Maker:** Evolution Robotics.

**Specs:** Relies on a laptop or small form-factor PC with Windows 98 or higher and a 500MHz CPU. Nippy and flexible cart allows multiple physical configurations. Accessories also available.

**Programming environment:** Windows-only Robot Control Center offers programming through [if-then] statements.

**Good for:** Turning an old laptop into a robot. Also great for schools as it ships with a robotics curriculum for high schools.

**Cost:** US\$349 including shipping.

**Shop at:** [www.evolution.com/er1/buy](http://www.evolution.com/er1/buy)

### 912



**Maker:** White Box Robotics.

**Specs:** Packs a VIA Mini-ITX motherboard with 1GHz CPU and runs Windows. Can beam information via Wi-Fi into a heads up display or a TV. A keyboard and mouse can be plugged right in.

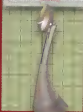
**Programming environment:** Evolution Robotics' Robot Control Center software for Windows.

**Good for:** Hobbyists who don't like soldering irons.

**Cost:** From US\$699 plus shipping.

**Shop at:** [www.whiteboxrobotics.com](http://www.whiteboxrobotics.com) from September 2004.

### Milo



**Maker:** RoboDynamics.

**Specs:** Ships with Windows XP embedded and a choice of x86 chip options from Mini-ITX to Pentium M. Over 120cm tall, Milo looks like designer furniture but packs a Web server so you can log onto the 'bot and drive it over the Web.

**Programming environment:** API allows third parties to develop applications and behaviours. Owners control the 'bot by voice or plug it into a keyboard to treat it like a normal PC.

**Cost:** US\$3,500 for a fully-specced 'bot. Less for lower-powered machines.

**Shop at:** [www.roboDynamics.com](http://www.roboDynamics.com) from October 2004.

### Open Automation Project



**Maker:** Open source project with one sole contributor.

**Specs:** Powered by a 1GHz Mini-ITX board and Red Hat 9. <http://oap.sourceforge.net> recommends off-the-shelf components that should be familiar to electronics aficionados.

**Programming environment:** Open source software plus GPL tools including Player/Stage, Orocos, Coriander and more.

**Good for:** Linux buffs unafraid to cut code.

**Cost:** From around US\$2,000.

**Shop at:** <http://oap.sourceforge.net/prototype.php> offers a bill of materials and links to online retailers.

### Automower



**Maker:** Electrolux

**Specs:** This robotic lawnmower has undisclosed computing power. Boasts "three razor-vine blades" and the ability to locate its docking station before its battery goes past its one-hour life.

**Programming environment:** Set up the "perimeter wire system" to tell it where to mow, then use a timer to tell it how long to mow for.

**Good for:** Mowing the lawn.

**Cost:** \$1,999.

**Shop at:** European hardware stores or [www.automower.de](http://www.automower.de).

### Roomba Robotic Floorvac



**Maker:** iRobot.

**Specs:** Undisclosed CPU powers a 'bot that really sucks: its sole purpose is to apply artificial intelligence to the task of vacuuming for up to 90 minutes. "Cliff Avoidance Sensors" stop this machine behaving like a lemming.

**Programming environment:** Virtual Wall Unit will block up to 15 open doorways" to keep Roomba cleaning in a designated area.

**Good for:** Vacuuming.

**Cost:** US\$200 plus shipping.

**Shop at:** [www.irobot.com](http://www.irobot.com)

### PatrolBot



**Maker:** ActiMedia.

**Specs:** Runs an undisclosed embedded Linux on a VersaLogic V58C-8 EBX 586 Pentium III-embedded computer. Can detect motion, heat, smoke or gas and can carry an RFID reader or other USB device.

**Programming environment:** ActiMedia's Advanced Robot Control System application.

**Good for:** Sentry duty.

**Price:** From US\$30,000.

**Shop at:** [www.actimedia.com](http://www.actimedia.com)

### Wakamaru



**Maker:** Mitsubishi Heavy Industries.

**Specs:** Linux-based but with no hardware specified, Wakamaru has humanoid form and senses – sight, hearing, touch/force sensing and the ability to speak. One metre tall, this 'bot is designed to "live beside you from wake up time to bed time in harmony with your life".

**Programming environment:** Recognises up to 10,000 voice commands.

**Good for:** General household duties.

**Price:** Approximately ¥1million.

**Shop at:** [www.wakamaru.net](http://www.wakamaru.net) (Japanese only).

### SR4 autonomous mobile robot



**Maker:** Smart Robots.

**Specs:** Powered by an unknown Linux with a Java VM running on ARM processors. This tall robot has four wheels, built-in Wi-Fi and can be enhanced with many sensors and peripherals.

**Programming environment:** Java with open source community to write applications.

**Good for:** Serious programmers who don't mind starting from scratch.

**Price:** US\$1,995 plus shipping.

**Shop at:** [www.smartrobots.com](http://www.smartrobots.com)

## DigiCell

- Easiest way to construct your digital home
- Central-Cell of multiple digital devices



### a Connectivity Upgrade from DigiCell



### b Compares of Usage Models



### c Activate Software Gateway

From one traditional Access with no GIGAs to multiple use of original DigiCell gateway

### d Connect with MEGA Stick

From one traditional Access with no GIGAs to multiple use of original DigiCell gateway



# Grantsdale with CoreCell Technology

## 915P Apex (MS-7038)

- Intel® Grantsdale-P + iCH6R chipset
- Socket 775 for Intel® Pentium® 4, Prescott and Tejas processor
- FSB 800MHz
- 4 DIMMs for Dual Channel DDR2 533 memory up to 4GB
- 1x PCI Express X16
- 2x PCI Express X1, 3x PCI
- 8x USB 2.0 (480Mbps)
- Onboard PCI Express 10/100/1000 Gigabit Ethernet LAN (Optional)
- 3x IEEE 1394 up to 400Mbps (Optional)
- 4x Serial ATA + 1x Parallel ATA 100 by iCH6R
- Support AHCI RAID 0,1
- 2x Parallel ATA 133 connectors by VIA RAID, Support RAID 0,1,0+1
- 7.1 Channel High Definition Audio, Universal Audio Jack (UAA)



## LGA775 Processor

Supports the highest performance Intel® desktop processors on LGA775 processor package. Supports platform longevity with today's highest Intel® processor frequencies and delivers greater system bandwidth.



## PCI Express

Designed for bandwidth-intensive applications, PCI Express x16 Graphics delivers up to 16GB/s throughput, and up to 4x faster than previous high-end discrete graphics solutions. PCI Express x1 I/O offers 500Mbps concurrently for 2x bandwidth over traditional PCI architecture.



## Dual-channel DDR2

memory architecture naturally supports faster transmitting and lower power consumption. Dual single module to achieve 6-GB/s bandwidth. There is no compromise between stability and overclocking on DDR2.



## Communication Slot

Supports standard PCI, PCI Express, FireWire, USB, and other communication slots. Network card, Modem, and other communication devices can be connected to the system. The system can be connected to the Internet, LAN, and other networks.



# MSI Grantsdale platform, with high-bandwidth interfaces and discrete graphics, supporting the Intel® Pentium® 4 Processor with Hyper-Threading Technology.

## 925X Apex (MS-7032)

- Intel® Anandwood + iCH6R chipset
- Socket 775 for Intel® Pentium® 4, Prescott and Tejas processor
- FSB 800MHz
- 4 DIMMs for Dual Channel DDR2 533 memory up to 4GB
- 1x PCI Express X16
- 2x PCI Express X1, 3x PCI
- 8x USB 2.0 (480Mbps)
- Onboard PCI Express 10/100/1000 Gigabit Ethernet LAN (Optional)
- 3x IEEE 1394 up to 400Mbps (Optional)
- 4x Serial ATA + 1x Parallel ATA 100 by iCH6R
- Support AHCI RAID 0,1
- 2x Parallel ATA 133 connectors by VIA RAID, Support RAID 0,1,0+1
- 7.1 Channel High Definition Audio, Universal Audio Jack (UAA)



## 915P Neo (MS-7032)

- Intel® Grantsdale-P + iCH6R chipset
- Socket 775 for Intel® Pentium® 4, Prescott and Tejas processor
- FSB 800MHz
- 4 DIMMs for Dual Channel DDR2 533 memory up to 4GB
- 1x PCI Express X16
- 2x PCI Express X1, 3x PCI
- 8x USB 2.0 (480Mbps)
- Onboard PCI Express 10/100/1000 Gigabit Ethernet LAN (Optional)
- 3x IEEE 1394 up to 400Mbps (Optional)
- 4x Serial ATA + 1x Parallel ATA 100 by iCH6R
- Support AHCI RAID 0,1
- 2x Parallel ATA 133 by VIA RAID, Support RAID 0,1,0+1
- 7.1 Channel High Definition Audio, Universal Audio Jack (UAA)



## MSI Mega Cache15/MSI Mega Player515



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WA Tel: (08) 9389 4422  
VIC Tel: (03) 9545 3968

Australia  
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Tel. 61-2-9748-0070  
Fax. 61-2-9748-0799  
http://www.msi.computer.com.au



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# WORKSHOP

Hands-on with hardware and software, plus bonus CD content

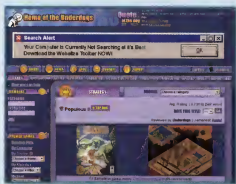


## Bonus CD software

Most Workshop articles are accompanied by bonus software loaded onto our cover CD set. Just look for this icon — the software it identifies is often integral to the article. The selection ranges from full-working versions and trial versions to shareware and freeware.

APC cannot provide tech support for these programs, but if you have a problem with the CDs themselves, by all means holler our way (see page 10 for details on how to contact our CD team).

## Site of the month



**www.the-underdogs.org**

Since the advent of PC gaming, there have been some brilliant titles that, for whatever reason, just haven't sold as well as they should. The Home of the Underdogs ([www.the-underdogs.org](http://www.the-underdogs.org)) gives those underrated games a second chance.

On the site, you'll find thousands of game reviews. Each review comes complete with myriad resources, such as how you can get a copy of the game, system requirements, multiplayer modes, screen shots and related links.

While you won't find abandonware on this site, anything that has been classified as freeware is usually directly downloadable.

But downloading games is just the start. The Scratchware Manifesto, for instance, is an essay laying down the philosophy by which the site believes that games should be developed.

There's also a large community associated with the site, ranging from users who are keen on wandering down memory lane to those who are just curious about PC gaming in general.

## 118 Wireless Network security

Worried about wireless network security? *Jarrod Spiga* details a number of techniques, both standard and unorthodox, to help build a secure solution.

## 122 Windows Small Business Server

Running a small business network part-time is a difficult task. *Paul Schnackenburg* explains how Microsoft's Small Business Server can make the job easier.

## 126 Internet IE security

Countless users write off Internet Explorer as being too insecure to run. *Jarrod Spiga* demonstrates how to tighten up the browser's default security options.

## 128 Linux Commands cheat sheet

With this list of basic Linux commands and sample usages, you'll never have to worry about forgotten commands again.

## 130 Linux Debian, part 2

Now that you have Debian installed, it's time to get down to business. *Jarrod Spiga* details the basics of X-Windows and the shell.

## 134 Internet Apache, part 2

You've got the Apache Web Server installed and running, but now what? *Jarrod Spiga* explains where to put pages and how to get Apache to serve them.

## 136 Windows Boot.ini

*Lachlan Grant* describes the switches in the BOOT.INI file, and how they can be employed to troubleshoot problems.

## 138 Graphics Optimisation

*Asher Moses* moves beyond mere frames per second and reveals a variety of ways you can help maximise the performance of your PC's graphics subsystem.

All code fragments and examples given in Workshop articles are for demonstrative purposes only. Questions or comments? Email [workshop@apcmag.com](mailto:workshop@apcmag.com).



# Worry-free wireless

Concerned about wireless network security? *Jarrod Spiga* details a number of techniques, both standard and unorthodox, to help build a secure solution.

Wireless hardware sales have gone through the roof in the last year, and the various 802.11 technologies have evolved to the point where the gear is affordable, fast and user-friendly.

However, it's also so insecure that even the most inexperienced hackers can break into some networks. And with new networks hitting the airwaves every day, the number of targets is increasing.

It's not difficult to inadvertently log on to an unsecured wireless network. Thanks to the "generous" configurations wireless routers offer wireless NICs, data can be effortlessly leeched from Internet connections. The ease of breaking into such networks is alarming — just imagine the excess usage charges an unscrupulous hacker could rack up on your Internet access account.

It's necessary to secure your network to protect any data and personal information contained on your system or network, including email, passwords, documents, plus banking and credit card details. The fact that your network is free of wires also means that blocking access isn't as simple as disconnecting a phone line or yanking out a Cat5 cable.

A completely secure network can block unauthorised access in numerous ways. This isn't difficult to do — just set up protection on each layer of the Open Systems Interconnection (OSI) model.

## LAYER 1 — GET PHYSICAL

The first layer in the OSI model is the physical layer. This refers to the physical medium that conducts the signal across the network. In wired networks this signal is electronic, in wireless networks it's electromagnetic.

Ideally, a home network should be accessible in some locations but not others. For example, you want it to be available in your lounge room, but not in the lounge room of the house next door.

For this reason, the physical location of your access point is crucial. There's no point keeping it in the study at the back of the

house if you only ever access the network from the lounge room at the front of the house. Run a network cable to the living room if you have to. If you absolutely have to position your access point away from a power outlet, consider using a Power over Ethernet injector (described in APC July, page 142).

Some access points have the ability to adjust the transmitter power. Increasing this maximises signal strength and range. However, if you're only using wireless devices within a 10m range, reducing the transmitter power is one way to limit the reach of your network and, by extension, the possibility of unauthorised access. Lower the power output, then use a tool such as NetStumbler to check signal strength at various locations where you connect to the network.

In some cases a compromise has to be made between signal strength and transmission power. A lower signal-to-noise ratio slows down your connection to the network. Consider the merits of putting up with slower network access at infrequently used locations in order to minimise the network's range and maximise security.

## BE INVENTIVE

If your access point features screw-on SMA antennae connectors, the omnidirectional antennae which come as standard can be replaced with directional ones. This also has the added bonus of giving much better signal-to-noise performance in coverage areas.

You can also block your signal from certain locations by using everyday household materials. For instance, window tinting film and aluminium foil reflect a lot of the electromagnetic signal that wireless devices emit. That's why many companies tint their windows to restrict the range of their wireless networks.

If your neighbours have wireless networks running on a channel, find out whether it's possible to use the same channel. There will certainly be locations where your Wi-Fi adaptor can hop between the two networks, so make sure that the places where you use your network aren't among them. If the number of locations where devices can receive the network signal are reduced, attempts at gaining unauthorised access can be restricted. After all, if a hacker has no signal, they can't connect to your network.

## LAYER 2 — LINKING DEVICES

Sitting above the physical layer in the OSI model is the data-link layer. This is home to the commonly used access prevention mechanism known as Wired Equivalent Privacy (WEP).



### Bonus CD software

• NetStumbler • WinRADIUS • Wi-Fi Power Kit.

### Skill level

Intermediate

### Requirements

Wireless home network.

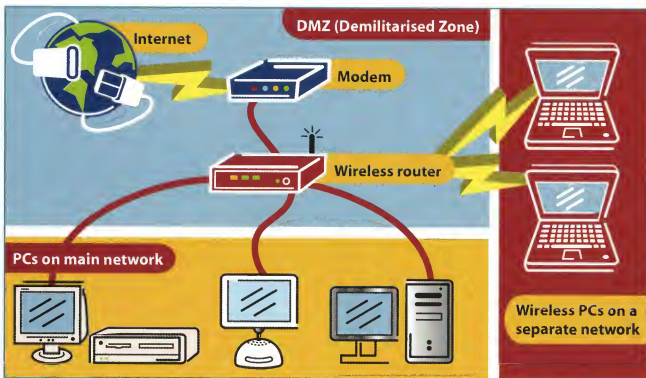
### Time to complete

4 hours (approx)



**Point in the right direction:** replacing your omnidirectional antennae with planar directional antennae restricts coverage to a smaller area and increases signal strength.





**The demilitarised zone:** a couple of wireless routers will configure both wired and wireless clients an separate IP networks, allowing for a more comprehensive firewall configuration.

If you don't currently use WEP, you really should — almost every access point and card supports the encryption of data using at least 40-bit keys, with most gear supporting more complicated keys. These days, 128-bit encryption should be the minimum.

Use an even longer key if possible, but be aware that all of the devices on the wireless network need to support the key length in order to establish a link on the network. If you have a card that only supports 40-bit encryption, consider upgrading it — new cards provide considerably faster network speeds too.

Setting up a WEP key is usually as simple as logging on to your access point's management interface and setting up a shared private key. WEP keys only contain hexadecimal characters, with each character representing four bits of the key.

#### WEP IS THE WORD (OR PHRASE)

A number of access points can now generate WEP keys based on a word or phrase that you enter. While not as secure as a randomly generated key, it provides you with a mechanism to help you remember what the key is. Keep the key secure — never write it on a piece of paper or store it in a text file on the desktop.

Once a key has been defined on the access point, configure any device that connects to the network. As with any password, change this key from time to time in order to minimise the chances

of a break-in due to a brute force attack.

Most access points also have machine address code (MAC) filters. Every piece of hardware on a network is assigned a MAC, often referred to as a hardware or physical address, which is usually expressed as six pairs of hexadecimal characters making up a 48-bit code. In order to deliver data properly, the header of every frame sent over the physical layer has a source and destination MAC embedded in it.

If MAC filtering is enabled on an access point, the filter examines the headers of each frame that passes through its wireless interface. If a frame is received from the wireless network from a MAC not listed in the access control list (ACL), the frame is dropped. The same occurs if a frame destined for a MAC isn't included in the ACL on the wireless network.

It's straightforward to find out what the MAC of your network interface is under Windows 2000, XP or Small Business Server 2003. Simply bring up a command prompt (Start > Run > cmd), and type in:

```
ipconfig /all
```

The MAC is listed as a physical address, and will be similar to 00-02-A5-7F-3B-D6. On a Linux system, enter the following when a command prompt is brought up:

#### Inside info

- NIST Computer Security Response Center Whitepaper [http://csrc.nist.gov/publications/nistpubs/800-48/NIST\\_SP\\_800-48.pdf](http://csrc.nist.gov/publications/nistpubs/800-48/NIST_SP_800-48.pdf)

- Setting up WPA on a Windows Network (Business) [www.microsoft.com/technet/prodtechnol/winxpro/deploy/ed80211.mspx](http://www.microsoft.com/technet/prodtechnol/winxpro/deploy/ed80211.mspx)

- Best Practices for Wireless Security [www.computerworld.com/mobiletopics/mobile/story/0,10801,86951,00.html](http://www.computerworld.com/mobiletopics/mobile/story/0,10801,86951,00.html)

- Seven Security Problems of 802.11 Wireless [www.oreillynet.com/pub/a/wireless/2002/05/24/wlan.html](http://www.oreillynet.com/pub/a/wireless/2002/05/24/wlan.html)

- Wardriving and Warchalking [www.wardrive.net](http://www.wardrive.net)

ifconfig eth0

where `eth0` is the alias for the networking interface you're trying to identify. In this case, the MAC is listed as `HWaddr`, and will be in the form `00:02:A5:7F:3B:D6`.

The same form is used on Mac OS X systems and is accessible by going to System Preferences > Network then double-clicking on your adaptor. It shouldn't take too long to discover all MACs on the network. Enter the adaptor codes that the wireless network needs to make contact with in your access point's MAC filtering ACL.

## WPA AND RADIUS

If you're a more advanced user, look into Wireless Protected Access (WPA). This allows you to log in to a Remote Authentication Dial-In User Service (RADIUS) server, which then uses the Temporal Key Integrity Protocol (TKIP) to forward a WEP key to the client. After a predefined period of time, another WEP key is generated and applied to the access point. This key is then sent to all authenticated clients.

In order to use this feature, your access point must support WPA, and a WPA-capable RADIUS server must be running on your network. Windows Server operating systems come with a RADIUS server — the Routing and Remote Access (RRAS) service under Windows Server 2000, or the Internet

Authentication Service (IAS) under Windows Server 2003 — but if you're using another operating system you'll need a third party add-on. A free version of WinRADIUS for Windows 2000 Professional or Windows XP is available on this month's cover CD set. Linux users should check out [www.freeradius.org](http://www.freeradius.org).

## LAYER 3 — MAKING THE NET WORK

The third layer of security is the network layer — where all the IP action happens. This is one area where you can really be imaginative with ways of deterring any would-be hackers who've managed to bypass layer 1 and 2 security mechanisms.

A number of access points and routers feature DHCP servers. When enabled, such features make it easy for any client that connects to the network to receive a valid IP address. Unfortunately, it also makes it very easy for unauthorised users to pick one up.

A more secure solution is to disable your DHCP services and manually set the IP configuration on all devices. If you're an advanced user, configure the DHCP server to allocate dummy IP addresses that fall outside your IP range's scope (assuming that your access point allows for this).

To be really deceptive, allocate addresses in your ISP's subnet — that way, any unauthorised user won't be able to receive data from the Internet, even if your router relays the outgoing request.

If you don't want to disable DHCP, at least minimise the number of addresses available for lease and create an

appropriate subnet mask for the network. Depending on your access point's features, you may even be able to tie each IP address in the DHCP scope to a MAC.

This is one way to ensure the DHCP server always assigns the same IP to a NIC, which can help with network auditing.

## SUBNETS

Caution also needs to be exercised if you're using huge subnets on your network. The larger the subnet, the easier it is to randomly pick a usable IP address. To minimise the chance of this happening, count how many hosts are on your network, add two (for network and broadcast addresses), increase that figure to the next power of two and subtract that figure from 256 to

obtain the last octet of your subnet mask. For instance, if you have a total of three hosts on your network, an appropriate subnet mask would be 255.255.255.248.

Choosing an unusual subnet can also make it harder for hackers to guess a valid IP address. With the above subnetting scheme, using the addresses 172.16.87.145 to 172.16.87.150 for your hosts is harder to guess than the 10.0.0.1 to 10.0.0.6 range.

Of course, you can take a more reactive approach with an access point that supports IP address filtering — addresses can be blocked in your subnet to achieve the same effect. If you want to get really imaginative, consider intentionally filtering the majority of the subnet as a decoy measure.

## DEMILITARISED ZONES

In networking speak, a demilitarised zone (DMZ) is a special subnet that is neither public nor private. Setting up your wireless network as a DMZ involves having all wired hosts on one subnet and all wireless hosts on another. A router is used between the subnets to transmit data between both networks.

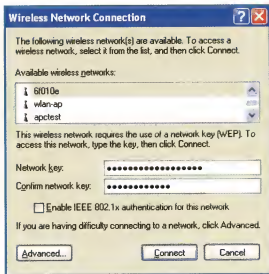
There are a number of advantages to doing this, the biggest being the ability to set up a firewall between the two networks, giving greater control over what traffic is permitted to cross the router.

A number of wired and wireless routers support DMZs. If yours doesn't and there's a Linux PC on your network, that system can easily be turned into a router. This is as simple as dropping an additional NIC into the Linux box and configuring an iptables script (see APC September 2003, page 132). This can also be achieved with a Windows system, but it's considerably more difficult to get running in a secure fashion.

## KEEP ON THE LOOKOUT

Remember, there is no single precaution that can guarantee your network is completely secure. Even if you use all the methods outlined in this Workshop, it's still possible that a really persistent hacker will be able to break into your network.

By the same token, you may choose not to implement all of these security tips either. But it's not really about making your network completely impenetrable. Instead, all you have to do is make it challenging enough for malicious users to think it's not worth the effort to crack. [www.pcworld.com](http://www.pcworld.com)



**WEP is weak:** there's more to securing your network than just WEP. Why let this be the only screen that hackers have to get past?

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# Practical SBS administration

Running a small business network part-time is a difficult task.

*Paul Schnackenburg* explains how Microsoft's Small Business Server can make the job easier.

Managing any business network is an arduous task, even if it's only a small network. Your co-workers are dependent on systems running during core hours (if not 24 hours), appropriate levels of support, and protection against viruses and other malware. And watch out if the backups aren't done properly.

Microsoft's Small Business Server (SBS) was developed specifically for system administrators, but it also has its share of quirks. The following tips will help you unleash SBS's full functionality.

**Application deployment:** when rolling out client computers, use the server administrator console wizard to deploy additional applications. To do this, copy the installation files from the CD to a ClientsApps share on your server.

To access the appropriate deployment wizard, SBS 2000 users should navigate to Computers > Define Client Applications > Add. Under SBS 2003, browse to Client Computers > Edit Applications.

Give the application a name and then define its UNC installation path (\\server\_name\ClientsApps\application\Setup.exe, for instance). If you want the app to install without input from users, the setup program needs to support quiet installation (usually /q). Different setup programs can also be defined for different Windows OSes.

**Group policies:** these can be used to automatically install software on client computers. This works best with installers that come as MSI packages. Using Group Policy to install client applications gives far more control than the SBS console, but if the simpler setup works for your network, don't complicate things.

Expand Active Directory Users and Computers (ADUC), right-click on your local domain name and select Properties > Group Policy. In SBS 2003, click Open, right-click on the Client Computer policy and select Edit. In SBS 2000, select the Default Domain Policy > Edit. Next, expand the computer configuration branch.

To install an application on a computer, assign it here. If you prefer applications to be available on a per user basis, expand the User Configuration >

Software Settings branch. From here, applications can be published or assigned. Publishing doesn't install the application, but it allows you to install it via the Add/Remove Programs option in Control Panel. Assigning a program to a user sets a shortcut on the Start menu. However, the app only installs when the shortcut is selected. Right-click, select New Package and point to the UNC path the installation files are located in. Then select whether you want to assign or publish the application.

## EXCHANGE RATES

**Internal email hosting:** if possible, use an Internet connection with a dedicated IP address and register a domain name. Hosting your own email gives you more flexibility than relying on the ISP's POP3 connector: you can keep the same email addresses if you change ISP, and add as many mailboxes and aliases as needed.

When you obtain a dedicated IP address, ask the DNS provider to configure the domain name with appropriate MX (Mail Exchanger) and A (Address) records, so that all email destined for your domain is routed to the Exchange server. When this is done, run the Internet Connection wizard and select Use SMTP for Internet Mail (email is delivered directly to my server in SBS 2003) and disable POP3 electronic messaging. **Smart hosts:** defining a smart host sends all outgoing mail from Exchange to the server you specify for routing, instead of attempting to deliver mail directly.

**Open relays:** a small mistake in the configuration of Exchange's SMTP connector could leave your server open to spammers peddling their wares through your server. To perform an open relay test on your server, go to [www.abuse.net/relay.html](http://www.abuse.net/relay.html) (registration is compulsory).

Microsoft's Knowledge Base article KB304897 (<http://support.microsoft.com/default.aspx?cid=kb;LN;KB304897>) contains detailed instructions on how to use telnet to test the server for open relaying.

Be aware that spammers are now attempting authenticated relaying. If a spammer gets hold of a username and password, they can flood emails through your server by using these credentials, even if it's not an open relay. Be sure to use strong passwords, and utilise your audit logs.

**Backups:** backing up the Exchange server is vital and should be done daily. Using the built-in Windows backup program, select MS Exchange Server > server\_name > First Storage Group.

All email, calendar and public folder data is stored in two databases (four files in total

## Skill level

Advanced

## Requirements

Microsoft Small Business Server 2000/2003.

## Time to complete

Continuous

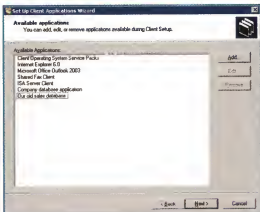
## Inside info

■ Microsoft Small Business Server 2003

[www.microsoft.com/windowsserver2003/sbs](http://www.microsoft.com/windowsserver2003/sbs)

■ Microsoft Knowledge Base

[http://support.microsoft.com/?scid=fh;\[ln\];kbhowto](http://support.microsoft.com/?scid=fh;[ln];kbhowto)



**Deploy apps:** the server administrator console wizard automates the installation of apps on client computers.

—priv.edb, priv.stm, pub1.edb and pub1.stm). In order to increase reliability, these databases aren't edited directly. Data is cached in easily edited, plain text LOG files. When the server is idle, the contents of the LOG files are written into the appropriate database. Server crashes can be detected by checking the LOG files upon reboot and databases can be brought back to a consistent state.

A normal (full) backup commits the information in the LOG files to the databases before performing the backup. The incremental and differential backup types archive the databases and LOG files "as is", making restores more difficult and time-consuming.

**Maintenance:** at the end of every month, take the time to clear out the \Program Files\Exchsrvr\badmail folder; this is where Exchange stores mail data that it can't deliver.

**Recovery:** to prevent accidental deletion of email, configure Exchange to retain deleted messages for a period of time, allowing the user to recover deleted emails from within Outlook. Go to Exchange Server > server\_name > First Storage Group, right-click on Mailbox Store, select Properties, then configure the options under the Limits tab.

**Quotas:** to conserve disk space, impose mailbox quotas using the same Limits tab. By setting a storage limit, you can issue warnings and prohibit sending when users approach or reach their quotas. You can also set limits on individual mailboxes by going to Users, double-clicking on a user account, and selecting Exchange General > Storage Limits.

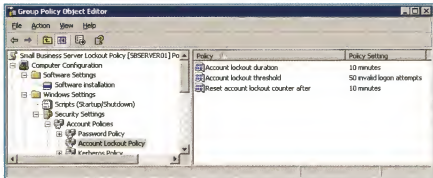
**Searching:** educate your clients about Search folders in Outlook 2003. These provide different views of Outlook data (including email) without actually moving the information.

## SHARING SAFELY

**Set shares:** file sharing is a vital function of any collaborative environment. Plan shares early to avoid a mess later. Create a policy stating that no-one should store any company data on their local drives (perhaps with the exception of mobile users). Create a security group for each "department", even if it contains only a couple of users, and then create a share for each group. **Groups:** never grant permissions to individual users — it's difficult to maintain such a system. It's much easier to assign user accounts to groups and grant permissions to groups of users.

Irrespective of how you create shares, ensure appropriate share-level permissions are set. For instance, Administrators should have full access while the ability to change permissions should be granted to the Authenticated Users group, or any groups that you've created.

Don't grant permissions to the Everyone group



**The time delay safe:** setting appropriate account policies secures your network.

as guest users who haven't logged in to your network can access these shares if you do.

Use the Security tab to set more granular permissions. The group that uses this share should have Modify access, allowing them to add, change and delete files and folders, but not to change the permissions on anything. The Domain Admins group should have full control in order to change permissions or ownerships. Other groups that should have read access could be granted List Folder Contents, Read and Execute permissions, depending on their requirements.

**Redirection:** this feature is handy when users insist on storing data in their local My Documents folder. In SBS 2003, go to the Users snap-in and select Configure My Documents Redirection and, using the wizard that appears, choose where to store the data.

SBS 2000 has no wizard for this feature, so go to ADUC, right-click Domain and select Properties. Choose the Group Policy tab, then select Default Domain Policy > Edit. Folder Redirection is under User Configuration > Windows Settings > Folder Redirection. Right-click on My Documents and enable it. Ensure the server share to which you redirect all the My Documents folders has enough disk space to accommodate the data. The net result of this is that My Documents appears to be local, but is actually stored on the server.

## HOUSEKEEPING

**Check disk:** routinely verify drive integrity using Check Disk by right-clicking a drive in Explorer and selecting Properties > Tools > Check Now. Consider ticking both boxes to attempt to fix problems, but your server does need to be restarted. While it's best to run this check at night to minimise performance degradation, the process has to be started manually; it can't be scheduled. Check the results by looking in the Application event log for Winlogon events.

**Log maintenance:** check the Application, Security and System logs on (at least) a weekly



**Moderation is key:** applying Exchange quotas ensures your server won't run out of space.



► basis. Look for errors and refer to Microsoft's Knowledge Base for their meaning if the description of the event isn't sufficient. Don't obsess about getting rid of every single error message; some are benign or only happen once.

If you right-click a log file and select Properties, you can set the maximum log file size and what should happen when the limit is reached. Rotating log files monthly is highly recommended. To do so, right-click on each log and select Clear All Events.

**Performance anxiety:** If users complain that the server is slow, eliminate variables and try to replicate the problem. Find out if the problem only occurs at a particular time. Perhaps a scheduled backup is slowing things down. Determine if only one program is affected. If so, contact the vendor for recommendations on how to improve performance.

## SYSTEM MONITOR

The System Monitor, which is accessible by loading the Performance applet located in Administrative Tools, can greatly enhance your knowledge and understanding of the server. Countless objects can be monitored in this way, including processor, disk, network and memory.

Each object has a number of counters, but the trick is to monitor only the relevant ones. Add counters to be monitored by clicking the plus button. The Explain button serves its purpose by describing exactly what each counter monitors.

System Monitor only displays real time information, so use the Performance Logs

and Alerts > Counter Logs snap-in to track what's happening. Right-click, choose New Log, name it and start adding counters. Start the logging manually by right-clicking on the log and choosing Start. Make sure plenty of disk space has been allocated if you're logging over an extended period of time as the files can become quite large. Archived log files can be opened in System Monitor. **Fax:** the shared fax function in SBS allows all users to fax directly from their desktops, but incoming faxes need to be manually routed. In SBS 2000, this is done by designating a mailbox as the recipient of all faxes. Go to Microsoft Shared Fax (Local) > Devices and Providers > Devices > Modem > Incoming Methods > Route through Email.

Under SBS 2003, you have the option to deliver faxes to a SharePoint (Intranet) folder. To get this up and running, go to Fax (Local) and click the Configure Fax Services link.

**Uptime:** in SBS 2003, the number of days and hours the server has been running since the last restart is displayed in the Monitoring and Reporting applet by default. To enable it in SBS 2000, go to Server Status (Backoffice Home) > Configure View > System, and tick the System Up Time option.

**DNS:** the DNS server configuration is integral to how your internal network operates and also comes into play when your users surf the Internet. Follow the instructions in the Microsoft Knowledge Base article KB306802 (<http://support.microsoft.com/default.aspx?scid=kb;KB306802>) to set it up correctly.

[LN];KB306802) to set it up correctly. **SYSTEM LOCKDOWN**

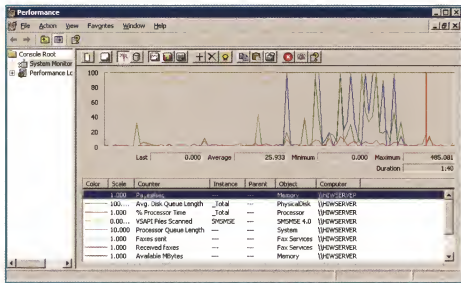
**Firewall:** once you've completed the Internet Connection wizard and chosen which level of access you want to allow, test the firewall. Go to [www.grc.com](http://www.grc.com), select Shields Up! and scan all service ports. It's normal to see port 25 open for SMTP mail if Exchange was chosen to handle mail in the wizard, and port 80/443 if you're using Outlook Web Access (OWA) or Remote Web Workplace (RWW) in SBS 2003. While Terminal Services (Remote Desktop in SBS 2003) can be used to remotely administer your SBS server, you should use a VPN connection rather than the Web interface; this adds another layer of security and is relatively easy to set up.

**Account lockout:** it's good practice to lock out accounts after a number of unsuccessful login attempts. To do this in SBS 2003, go to Advanced Management > ADUC, then right-click on your domain and select Properties. Choose the Group Policy tab and then start Group Policy Management Console. In SBS 2003 you can configure lockout in a Special Group Policy Object (GPO) called Small Business Server Lockout Policy. The steps are the same in SBS 2000 except you select the Default Domain Policy, which is where you define how many attempts users have.

The lockout that you configure here only applies to internal network logins. If your users are allowed to VPN/dial in to your server, account lockout in the registry needs to be adjusted. Details can be found in article KB310302 (<http://support.microsoft.com/default.aspx?scid=kb;LN;KB310302>) in Microsoft's Knowledge Base.

**Account management:** when an employee resigns from your company, their account should immediately be disabled. If important email is going to be sent to their account, forward it to another address and wait a few weeks before deleting the account.

**Antivirus:** ensure that antivirus software isn't scanning the \program files\Exchsrvr folder and the M: drive. Also, exclude the Exchange processes (store.exe, exmgmt.exe and inetinfo.exe in both SBS versions, as well as emsmta.exe and mad.exe in SBS 2000) from the real time scanner. If the latter isn't disabled, the real time scanner could corrupt the mail database. Exchange mail should be protected from viruses with an Exchange agent — don't just rely on file virus scanning, as email is the most common infection vector for



Performance pressure: the system monitor can log and graph system performance over time.

*Windows*

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# Keep surfing safe

Countless users write off Internet Explorer as being too insecure to run. *Jarrold Spiga* demonstrates how to tighten up the browser's default security options.

## Skill level

Beginner

## Requirements

Any Windows-based PC • Internet Explorer 6 or higher.

## Time to complete

1 hour (approx)

## Inside info

■ W3C P3P Overview

[www.w3.org/P3P](http://www.w3.org/P3P)

■ Microsoft — Setting up

Security Zones

[www.microsoft.com/windows/ie/using/howto/security/setup.asp](http://www.microsoft.com/windows/ie/using/howto/security/setup.asp)

■ SANS Institute Whitepaper  
[www.sans.org/rr/papers/67/287.pdf](http://www.sans.org/rr/papers/67/287.pdf)

Internet Explorer's default settings in a fresh Windows XP installation aren't exactly secure. Cookies can be easily exchanged between the browser and Web site, potentially sharing personal information, and features such as Install On Demand can be used to deploy malicious software or scripts on your system.

Secure practice dictates that all access should be restricted by default, allowing admission only when required. But such a configuration limits convenience and restricts the functionality of some sites to such a degree that you can't do what you need to do.

There's always going to be a compromise between security and functionality in any system, but that doesn't mean security settings should be lowered to such a degree that IE becomes vulnerable to attack.

### AUTO ADD-ONS

All Internet Explorer's security settings are located in the Tools > Internet Options menu. First, jump straight to the Advanced tab. The settings adjusted here affect every site you visit.

**1** Disable both Enable Install On Demand options. Install On Demand saves you from having to manually download and install applications and utilities, but the feature is also occasionally used to install malware. Ultimately, you should have the final say in what's installed on your system.

Enabling third-party browser extensions allows for additional toolbars and items that

modify how Internet Explorer (IE) behaves. Some third-party add-ons can be malicious, so consider disabling this option.

### A MATTER OF TRUST

The presence of a padlock icon at the bottom of the screen indicates that the connection between the browser and the Web site is encrypted with a server certificate.

SSL certificates are used to assure trust. They're supposed to work on the principle that if you trust a certificate authority, you can trust the site they assign certificates to. However, a number of fraudulent SSL providers are now popping up across the Internet. If one of these providers is in your trusted list, you could be sending sensitive information to an illegitimate site.

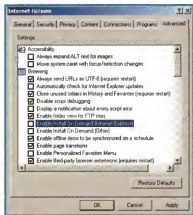
**2** Check your browser's trusted providers by going to the Content tab and selecting Publishers > Trusted Root Certification Authorities.

Invalid certificates can be used to encrypt transmissions between browser and server when it's not feasible to purchase a trusted certificate. However, the same trick can be used by dodgy site operators who want their sites to appear secure. Another alarming issue is the redirection of data entered into a secure form to an external site.

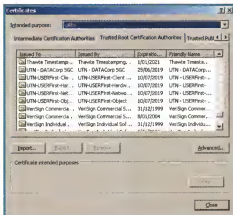
To minimise risk, ensure that the Check for publisher's certificate revocation, Use SSL 2.0, Use SSL 3.0, Warn about invalid site certificates and Warn if forms submittal is being redirected options under the Advanced tab are all enabled. Check security dialog boxes thoroughly.

### SECURITY ZONES

IE's Security Zones feature is rarely utilised, but becomes a powerful tool when used properly.



**1** Disable both Install On Demand options. This function saves time, but is occasionally used to install malware.



**2** Check which providers the browser trusts by going to the Content tab and selecting Publishers > Trusted Root Certification Authorities.



**3** Sites can be classified into four zones. The easiest way to define the level of security in each zone is to adjust the sliders.

**3** Sites are classified into four zones. By default, all public sites fall into the Internet zone, and all local sites (including those accessible via internal IP, UNC path or by circumventing a proxy server) fall into the Local Intranet zone. The other two zones (Trusted and Restricted Sites) are empty.

Zone security can be configured in a number of ways. The easiest is to use the sliders to define the level of security given to each zone. For more specific settings, click on the Custom Level button.

When IE loads a site, it determines which zone the site belongs to and applies those security settings. If IE can't determine which zone a site belongs to, it assumes that it belongs to the Internet zone.

**4** To securely configure zones, set the Restricted Sites slider to high (if a slider isn't visible, click on the Default Level button). Click on the Sites button and add any untrusted sites.

Including known spyware groups in this list, for instance, prevents any ActiveX applets being installed through IE. Be aware that any scripts on these sites, including JavaScript, won't run.

Set the Trusted Sites slider to medium, then click on the Sites button and add any secured sites that you trust — good candidates include Net banking sites.

When adding these sites, be sure to include the complete domain name (with <https://> in front of it) without using wildcards. This prevents sites with masked addresses — a technique often used in phishing scams — from being classified as trusted. Remember to leave the "Require server verification (<https://>)" box ticked for all sites in this zone.

After adding these sites, make things

more secure by clicking the Custom Level button. Disable (or prompt for) navigation of sub-frames across different domains, and prompt for a username and password when visiting the sites. The first option ensures that any content from other domains isn't loaded under the guise of the current site. The latter forces you to log in to these sites each time you visit them.

The Local Intranet zone can be used for other purposes. Most users don't have a local intranet, so this zone can be used for trusted unsecured sites.

Those users who do have a local intranet may want to exclude those sites from this zone — just because a site is local, there's no guarantee that it's trustworthy.

Adjust the slider for the Local Intranet zone to medium, click on the Custom Level button, and adjust the same options as your Trusted Sites zone. After accepting these options, click on the Sites button.

Note that this screen is different to those of the other zones. Three options are displayed that Internet Explorer uses to define what sites it can automatically classify into this zone. Secure practice is to uncheck them all and treat any internal sites in the same way as Internet sites. Once this is done, click Advanced.

**5** At the Local Intranet Sites screen, add all the Web sites you frequently visit, including download sites and Microsoft's Update sites.

The Internet zone's settings are used for any site by default. As a result, the Security Settings slider should initially be on a high setting. However, in order to improve the functionality of these unclassified sites, hit the Custom Level button and go through the settings. Ultimately, the level of security

set in this zone is up to you, since these settings apply to sites by default.

Many of the scripting permission options can be set to Prompt — the resulting pop-up notification boxes show which scripts each page loads, and can remind you to define the site into another zone. ActiveX scripts and file downloads should be left disabled — if you need to download a file from a site, add it to the Local Intranet zone.

#### LOCKING THE COOKIE JAR

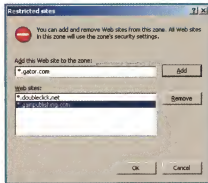
By default, IE exchanges cookies with all sites unless the cookie contains personally identifiable information, and with third-party sites provided they have a defined compact privacy (P3P) policy.

**6** For more control over cookies, select the Privacy tab and set the slider to maximum. Hit the Advanced button, tick the Override automatic cookie handling box, and select the Prompt action for both types of cookies. That way, when the request to exchange cookies comes up, you'll have the option of allowing or denying cookies.

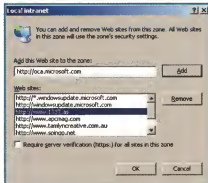
#### SHORT TERM PAIN, LONG TERM GAIN

Setting up IE this way can be a hassle. You'll be on the receiving end of a constant barrage of feedback from sites asking whether you want to exchange cookie information or run scripts, advising that ActiveX controls are disabled, and so on. You'll even encounter the occasional page that won't load as a result of these settings.

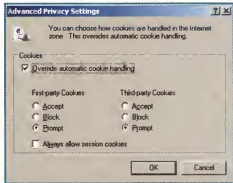
But if you stick with it, assign sites to their correct zones, and accept and deny cookies appropriately, you'll minimise the number of warnings and be browsing more securely too. [\[12\]](#)



**4** In the Restricted Sites zone, set the slider to high, click on the Sites button and add any untrusted sites.



**5** At the Local Intranet Sites screen, add all frequently visited sites, including download sites and Microsoft's Update site.



**6** For more control over cookies, hit the Advanced button, tick the Override automatic cookie handling box and select the Prompt action for both types of cookies.



A printable PDF version of the cheat sheet is included on this month's cover CD set.

# Linux commands cheat sheet

With this list of basic Linux commands and sample usages, you'll never have to worry about forgotten commands again. The items contained within brackets are optional, and type `man <command>` at a shell if you need more information.

Command	Description	Usage	Example	Example description	Equivalent Windows command
alias	Create an alias	alias [name='value']	alias la='ls -la --color=auto'	Creates an alias for the <code>ls</code> command which displays a detailed list with various file types in different colours.	N/A
cat	Display the contents of a file	cat [options] [file1] [file2] ...	cat index.html	Displays the contents of the index.html file.	type
cd	Change directory	cd [-LP] [directory]	cd /usr/local/bin	Changes the /usr/local/bin directory.	cd
chgrp	Change group ownership	chgrp [options] group file1 file2 ...	chgrp apache index.html	Changes the group ownership of the index.html file to the apache group.	N/A
chmod	Change access permissions	chmod [options] mode file1 file2 ...	chmod 755 script.cgi	Changes the permissions of script.cgi so that everyone can execute and read it, but only the owner can write to it.	attrib
chown	Change file owner and group	chown [options] new-owner file1 file2 ...	chown root index.html	Changes the ownership of the index.html file to root.	N/A
cmp	Character-by-character compare between two files	cmp [options] from-file to-file	cmp index.html default.htm	Compares each character in index.html and default.htm, and displays the differences.	comp
cp	Copy one or more files to another location	cp [options] source destination	cp index.html index.html.bak	Makes a second copy of the index.html file in the same directory. The new copy has the BAK extension.	copy, xcopy
df	Display free disk space	df [options] [file]	df	Displays the used and free disk space on all mounted filesystems.	dir
du	Estimate file space usage	du [options] [file]	du	Displays the disk usage of the current directory.	dir
echo	Display message on screen	echo [options] [string]	echo Hello World!	Displays the Hello World! message on the screen.	echo
env	Display, set or remove environment variables	env [options] [name=value] [command [args]]	env HOME=/home/username	Changes the HOME environment variable to /home/username.	set
exit	Exit the shell	exit	exit	Exits from the current shell.	N/A
free	Display memory usage	free [options]	free -s 5	Displays current memory usage, updating it every five seconds.	N/A
fck	Filesystem consistency check and repair	fck [options] [filesystem]	fck /dev/hda1	Performs a filesystem check on the first partition of the primary master IDE drive.	chkdsk
grep	Search file(s) for lines that match a given pattern	grep [options] string [file1] [file2] ...	grep "search string" /home/*	Searches all files in /home for the occurrence of the "search string".	N/A
gzip	Compress or decompress named file(s)	gzip [options] file	gzip index.html	Compressed index.html into a file named index.html.gz.	N/A
kill	Stop a process from running	kill [options] pid	kill 1234	Terminates the process with id 1234. Use ps to determine a processes id.	kill
less	Display content one screen at a time	less [options]	cat index.html   less	Displays the index.html file on the screen, one screen at a time.	more



Command	Description	Usage	Example	Example description	Equivalent Windows command
ln	Make links between files	ln [options] target [linkname]	ln -s /var/www/html /home/user/website	Creates a shortcut named website from the user's home directory to the /var/www/html directory.	shortcut
locate	Find files	locate [options] string	locate perl	Searches filesystem databases for files containing the term perl.	dir /s
ls	List information about file(s)	ls [options] [file/directory]	ls -la /var/www/html	Prints a detailed list of all files and directories located in the /var/www/html directory.	N/A
man	Help manual	man [options] [command]	man man	Displays the manual for the man command.	N/A
mkdir	Create new folder(s)	mkdir [options] directory	mkdir html	Creates a directory named html under the current directory.	md
mount	Mount a file system	mount [options] [device/directory]	mount cdrom	Mounts the CD-ROM drive.	N/A
mv	Move or rename files or directories	mv [options] source destination	mv index.html /var/www/html	Moves the index.html file from the current directory to /var/www/html.	move
nice	Set the priority of a command or job	nice [options] [command [args]]	nice -n 19 httpd	Runs the httpd process with the lowest possible priority (-20 is the highest priority).	N/A
passwd	Modify a user password	passwd [options]	passwd	Prompts you to change the password for the current user. It will prompt for the old password first.	N/A
ping	Sends and echo packet to a host	ping [options] host	ping www.apcmag.com	Continually sends echo packets to the www.apcmag.com host.	ping
ps	Process status	ps [options]	ps -ef	Displays full list of all running processes.	mem
pwd	Print working directory	pwd [options]	pwd	Prints the directory the terminal is presently in.	cd
rm	Remove files	rm [options] file1 file 2 ...	rm -rf /var/www/html	Forces the removal of the /var/www/html directory and all files and subdirectories inside it.	del
rmdir	Remove folder(s)	rmdir [options] directory1 directory2 ...	rmdir /var/www/html	Removes the /var/www/html directory (assuming it's empty).	rd
shutdown	Shutdown or restart Linux	shutdown [options] when [message]	shutdown -r 20:00	Reboots the system at 8pm.	shutdown
sleep	Delay for a specified time	sleep [number]	sleep 30	Pauses for 30 seconds – useful in some scripts.	sleep
su	Substitute user identity	su [options] [username [args]]	su	Switches to the root user.	su, runas
tail	Output the last part of files	tail [options] [file1] [file2] ...	tail /var/log/error.log	Displays the last 10 lines of the error log.	N/A
tar	Tape archiver	tar [options] file1 [file2] ...	tar -czvf archive.tar.gz /var/www/html	Compresses the contents of the /var/www/html directory into a gzipped tarball named archive.tar.gz.	N/A
touch	Change file timestamps	touch [options] file1 ...	touch /var/www/html/index.html	Updates the timestamp on /var/www/html/index.html, or creates the file if it doesn't exist.	touch
top	List processes running on the system	top [options]	top	Provides an automatically-updating list of the most CPU intensive processes running on the system.	N/A
traceroute	Trace route to host	traceroute [options] host [packetsize]	traceroute www.apcmag.com	Prints a list of all routers (and IP addresses) that IP datagrams pass through en route to the www.apcmag.com server.	tracert
umount	Unmount a device	umount [options] [device/directory]	umount cdrom	Unmounts the CD-ROM drive.	N/A
unalias	Remove an alias	unalias [options] [name]	unalias la	Removes the alias named la.	N/A
uname	Print system information	uname [options]	uname -a	Prints all system information relating to the machine and OS.	N/A
which	Locate a program file in the user's path	which [options] file ...	which perl	Same as locate, but restricts the search to the user's path.	N/A

# Using Debian and X-Windows

You've managed to get Debian installed, but where do you go from there? In the second installment of this four-part Debian Workshop, Jarrod Spiga details the basics of X-Windows and the shell.

## In this series . . .

Part 1 — July  
**Debian install**  
walkthrough

Part 2 — August  
**Using Debian and**  
**X-Windows**

Part 3 — September  
**Becoming familiar**  
with Debian

Part 4 — October  
**Debian for**  
advanced users

## Skill level

**Intermediate**

## Requirements

APC June Debian 3.0r2 DVD. If you don't have the June issue of APC, you can purchase the DVD by sending a cheque or money order for \$6 (including postage and handling) to:

APC Debian DVD  
Attn: Helen Chen  
APC Magazine  
PO Box 4088  
Sydney NSW 1028

## Time to complete

**2 hours (approx)**

## Inside info

- The XFree86 Project  
[www.xfree86.org](http://www.xfree86.org)
- XFree86 Documentation  
[www.xfree86.org/current/index.html](http://www.xfree86.org/current/index.html)
- BASH programming HOWTO  
[www.tldp.org/HOWTO/Bash-Intro-HOWTO.html](http://www.tldp.org/HOWTO/Bash-Intro-HOWTO.html)

Many new Linux users become frustrated when they try to get X-Windows (also known as XFree86 or just X) working. In order to run efficiently, X-Windows doesn't attempt to detect your system's hardware each time it starts up; instead it relies on the configuration you supply in order to display its visual wizardry. This means that you need to identify which video card, mouse, keyboard and monitor drivers it should use.

## DO YOUR HOMEWORK

Before attempting to configure X, you need to gather detailed information about your system.

The most logical place to start is with the video card. Identify the exact model of card, what GPU it uses (ATI Radeon 9800XT or Nvidia GeForce FX5850, for example), and how much video RAM is onboard. It's also a good idea to determine which bus identifier it has.

If you don't have all this information at hand, start by running the following command:

```
lspci -v
```

and a list of all devices connected to your PCI bus will appear. Look for the entry that corresponds to your video card, such as:

```
01:05.0 VGA compatible controller: ATI
Technologies Inc: Unknown device 4336
(prog-if 00 [VGA])
Subsystem: Unknown device 1734:100a
Flags: bus master, stepping, fast
Back2Back, 66MHz, medium devsel,
latency 66, IRQ 5
Memory at f8000000 (32-bit, prefetch-
able) [size=64M]
I/O ports at b000 [size=256]
Memory at f0500000 (32-bit,
non-prefetchable) [size=64K]
Expansion ROM at <unassigned>
[disabled] [size=128K]
Capabilities: [58] AGP version 2.0
Capabilities: [50] Power Management
version 2
```

In this case, the first line indicates that an ATI video card is installed. The beginning of the line shows what the bus identifier is. The X-Windows configuration file requires that the identifier is expressed as [PCI:<bus>:<device>:<function>].

In this case, it's written as [PCI:01:05:00]. The fourth line indicates that the card has a total of 64MB of RAM available. Since the configuration file wants this figure to be expressed in kilobytes, multiply this by 1,024 and note the result.

In the Windows realm, you rarely have to worry about the configuration of your monitor. It's a different story under X-Windows however. Find out the exact model number of your monitor and check the manual or search the manufacturer's Web site for its details.

You need to know the horizontal sync range, vertical sync range and the recommended resolutions and refresh rates it can handle. The first two parameters are the most important — without this information, X-Windows may generate a picture that can damage your screen.

Lastly, make a note of the port your mouse is plugged into.

## MAKING THE CONFIGURATION FILE

Debian has a script to guide you through the creation of the configuration file. As the root user, run:

```
dpkg-reconfigure xserver-xfree86
```

This script asks a number of questions, starting with whether you want debconf to manage XFree86's configuration file. Select yes.

You'll then be asked which X server driver should be used. Select the option that matches your make of video card. (If it's an ATI Radeon card, select radeon instead of ati. Nvidia users should select nv.) Now enter an identifier for your video card, this can be any name you like.

Following these options, enter the video card bus identifier and amount of memory (in kilobytes). The next option asks if you want to "use [the] kernel framebuffer device interface". It's generally okay to answer yes to this, but if you encounter difficulty starting X, re-run this procedure and change your response here before making other changes.

Keyboard configuration is next. It's safe to accept most of the default settings — xfree86 XKb rule set, 104-key keyboard, X layout, no variant and no other keyboard options.

You'll then be asked which port the mouse is plugged into. If you're using a PS/2 mouse, select /dev/psaux. If you're using a serial mouse, select /dev/tty5#, where # is the number of the COM port. So you'll have a running config with a minimum of fuss, select the PS/2 option when describing your mouse — this can be changed later. If your mouse has only two buttons, ▶

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# X-SONIC

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► emulate three buttons. Don't enable scroll events from the mouse wheel — this option can also be changed from within X once it has started.

The monitor configuration is the area most people experience difficulties with. First, enter an identifying name for your monitor (again, this can be anything you like). Select monitor type as appropriate.

Now select the Advanced option and enter in your monitor's horizontal and vertical sync ranges. Don't guess these values — entering incorrect data can damage your screen if it isn't designed with a sync range failsafe.

Next, select all the resolutions that your monitor can handle, and the desired colour depth (24-bits is true colour).

The next option you're prompted with is: Select the XFree86 server modules that should be loaded by default. It's usually safe to leave this screen alone, though you'll need to deselect a few when it comes to installing other video drivers (this task is outside the scope of this Workshop).

Write the default Files section to the configuration file, which is located at `/etc/X11/XF86Config-4`. Then write the DRI section to the same configuration file.

## TAKING A TEST DRIVE

To see if you have a working configuration, enter the following:

```
startx
```

at the command prompt. This starts the X server and runs the default X client. If you encounter errors, try running through the configuration script again, making slight changes as you go. If your system freezes when loading the graphical elements, hit Alt+Ctrl+Backspace — this kills the X server and dumps you back at a command shell.

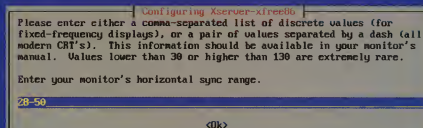
The default window manager will load, and you'll be in X-Windows.

## BACK AT THE COMMAND LINE

If you're fairly new to Linux, getting used to the command line prompt can be daunting. Love it or loathe it, entering commands at a prompt is the quickest way to perform basic tasks (the same applies for Windows).

With this in mind, a Linux command cheat sheet is included in this issue (see page 128). However, you're only doing the basics by entering single commands at a prompt. There are a number of constructs that greatly extend the functionality of any command.

## Debian Configuration



*The pause that refreshes: specifying incorrect refresh rates will stop X-Windows from displaying on your system.*

The first of these is redirection. When dealing with the shell, there are three screen buffers:

- **stdin** stores all data that you input to the shell.
- **stdout** stores any data that is being displayed. The number 1 is used to refer to stdout.
- **stderr** stores any error messages that are being displayed. The number 2 is used to refer to stderr.

There are a number of situations where you will want to redirect the output from an application to a different buffer.

For instance, a listing of all PCI devices in a system can be obtained by running the `lspci` command. The following redirect saves the information in a convenient text file:

```
lspci -v > pci-information.txt
```

Here, the **stdout** output is being redirected to a file named `pci-information.txt`. Using the `1>` redirect in place of `>` achieves exactly the same result.

By the same token, you can record all error messages generated by a command by using the following syntax:

```
grep wah * 2> grep-errors.txt
```

This searches the contents of all files for the string `wah`, and outputs all errors that it encounters to `grep-errors.txt` instead of displaying it on the screen.

You can also use the contents of files and insert them into commands. For example, this is frequently done when importing data into MySQL databases. The following command inserts the contents of the `database.sql` file into an existing database named `demonstration`:

```
mysql demonstration < database.sql
```

Pipes are another useful construct. In essence, they pass the output from one command on to another. If you want a listing of all text files in a directory full of files, enter:

```
ls -la | grep .txt
```

The `ls -la` command generates the listing and passes the output to the `grep` command. `grep` then filters out all lines not containing the string `.txt`, giving you the detail you want.

Of course, both types of constructs could be used together. For instance:

```
ls -la | grep .txt > listing-of-text-files.txt
```

saves the output above in `listing-of-text-files.txt`.

Constructs can be used with most Linux commands. Experiment and become familiar with them — they'll be of benefit to you in the long run. [ETTL](#)

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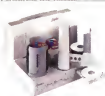


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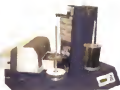
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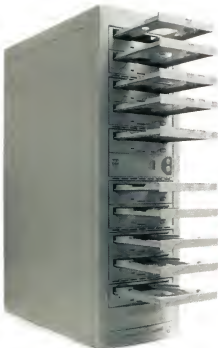


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# Getting Apache to do what you want

You've got the Apache Web Server installed and running, but now what? Jarrod Spiga explains where to put pages and how to get Apache to serve them.



## Bonus CD software

The Apache Web Server, versions 1.3.29 and 2.0.49 (source and binaries)  
 • ActiveState ActivePerl version 5.6.1.638 (binary)  
 • mod\_perl for Apache 1.3 and 2.0 • PHP version 4.3.6 (source and binaries)

## Skill level

### Beginner

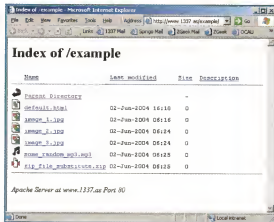
Configuration file editing involved.

## Requirements

An installation of the Apache Web Server.

## Time to complete

2 hours (approx)



**Contents page:** Apache has the ability to generate directory listings. Best of all, users can click on a file to download it.

Apache works straight out of the box — that is, there's a default configuration file present with Apache after the install. Check this by opening a browser and going to <http://localhost>. Apache loads the index.html file from the htdocs directory under the Apache installation directory in Windows, or from /var/www/html in Linux.

While the default configuration is enough to start serving Web pages, the configuration must be modified to perform more advanced tasks.

There are two ways to apply configuration directives to Apache — via the httpd.conf central configuration file, or by using configuration files located in the directory of the URL being served. These files are usually called .htaccess, but this can be changed.

For Windows systems with Apache installed, use forward slashes in all paths instead of backslashes. The latter is reserved for escaping other characters in config files.

The heart of the Web server is the httpd.conf file. From this one file, it's possible to control every aspect of how Apache runs. In most cases, however, it's used to provide a base configuration for the server. The file is made up of a series of directives, mixed with a lot of comments. The comments are often laden with useful information and examples, so it pays to read them in order to understand more about the server.

The httpd.conf file is broken down into three sections — global settings, main server settings and virtual host settings. Each section contains

different directives that have a different scope across the server. While virtual hosting doesn't have to be set up if only one site is being hosted, the first two sections are a must for any configuration.

Following is a list of customisations that can be made to the httpd.conf file. Most of these solutions can be used on a server regardless of whether it is hosting one site or one hundred. Remember that when a change is made to the httpd.conf file, Apache must be restarted for the changes to take effect.

**Changing the listening port and/or address:** by default, Apache responds to any request on port 80, on any IP address assigned to the system. To configure the server to only listen on certain ports or IP addresses, look for a line in httpd.conf that starts with `Listen`, and change it to:

```
Listen [ip-address:]port
```

Add as many `Listen` directives as required. Specifying an IP address is optional.

**Hosting more than one Web site:** a second instance of Apache doesn't need to be installed to host more than one Web site. There are two ways virtual hosting can be set up. An address-based virtual host sits on its own unique IP address and is best used when SSL has to be integrated on the site.

Almost every other site could be configured as a name-based virtual host. Since they all share the same IP and port information, Apache examines the headers of the request to determine which site the request should be directed to. If no virtual hosts match the details in the header, the main server site is used.

To set up a name-based virtual host, the `NameVirtualHost` directive has to be used in conjunction with a `VirtualHost` block directive. For an address-based virtual host, there's no need to use the `NameVirtualHost` directive. Scroll to the bottom of the httpd.conf file, and add:

```
NameVirtualHost ip-address[:port]
<VirtualHost ip-address[:port]>
    ServerName domain.com
    ServerAlias www.domain.com
    DocumentRoot /path/to/virtual/host/
</VirtualHost>
```

The `NameVirtualHost` directive allows users to specify the IP address (and optional port) that all name-based virtual hosts listed below should operate on.

The `VirtualHost` block directive must also contain an IP address (and optional port). For a name-based virtual host, this address and port must be listed in a `NameVirtualHost` directive above the `VirtualHost` block directive. For those setting up address-based virtual hosts, the IP defined must be different to any previously defined `NameVirtualHost` directives.

The directives applied to the main server site apply to all virtual hosts by default unless they are overridden. This is demonstrated in the example with the `ServerAlias` directive on the previous

page. The other two directives shown in the example *must* be redefined in every virtual host. `ServerName` needs to be defined so Apache can differentiate between virtual hosts on the same IP address and port. Having a virtual host pointing to the same directory as the main site defeats the purpose of setting it up in the first place. The `DocumentRoot` directive must also be redefined.

When setting up virtual hosting, make sure that Apache is already listening on the addresses and ports where the sites are being hosted (see the customisation on the previous page) or they won't be accessible.

When setting up virtual hosting for testing purposes, it's a good idea to edit the hosts file (located in the windows/system32/drivers/etc directory under Windows, or in the /etc directory under Linux) so that test sites can be accessed. **Changing the default page:** if someone enters your domain name into their browser, your server searches for a file named `index.html` in the sites root directory. If this file exists, the page is served. Otherwise, a 404 (file not found) error message is displayed.

There are many cases where the default page may need to be set to something else. For instance, the default file to be served may be called "default.htm", or the site could be entirely written in PHP. To change the default page, modify the `DirectoryIndex` directive in the main site configuration section of `httpd.conf`. For example:

```
DirectoryIndex index.html index.htm
index.php
```

This configuration attempts to load `index.html` as the default page. If the file doesn't exist, `index.htm` is the next file Apache tries to serve.

**Setting up a default favicon:** including a 16 x 16 favicon.ico image file in each directory means that when a page from that directory is loaded, the image will be displayed in the Web browser's location bar. To define an image as the default favicon, add the following lines of code under a site root configuration in `httpd.conf`:

```
AddType image/x-icon .ico
<Files favicon.ico>
    ErrorDocument 404 /path/to/
    favicon.ico
</Files>
```

If a file is loaded and the directory doesn't contain a favicon.ico file, a 404 error message is usually generated and the default favicon loads instead. To override the default favicon, place another favicon.ico file in that directory. **Generating directory/folder listings:** generally,

```
# # Virtual Host Management
#
# To be able to use the functionality of a module which was built to work with a
# virtual host, you must have such a virtual host configured and you have to
# place a <VirtualHost> section around your module-specific directives so they
# only affect the virtual host. For instance:
#
# <VirtualHost 64.151.72.236:80>
#     ServerName www.1337.as
#     ServerAdmin ap@www.1337.as
#     DocumentRoot /home/virtual/ssl/ssl/var/www/html
#     RewriteEngine on
#     RewriteCond %{REQUEST_FILENAME} !-f
#     RewriteRule ^/admin/ http://64.151.72.236:19630/webhost/services/virtualhosting/steedee
#     RewriteRule ^/user/ http://64.151.72.236:19630/webhost/services/virtualhosting/userdata
#     RewriteRule ^/login_domain/ http://64.151.72.236:19630/webhost/services/virtualhosting/userdata
#     Alias /public_html/ /home/virtual/ssl/ssl/var/www/html/
#     <Directory /home/virtual/ssl/ssl/var/www/html/>
#         Allow from all
#         AllowOverride All
#         Order allow,deny
#     </Directory>
#
#     <Directory /home/virtual/ssl/ssl/var/www/html/>
#         Allow from all
#         AllowOverride All
#         Order allow,deny
#     </Directory>
#
#     SetEnv SITE_ROOT /home/virtual/ssl/ssl
#     SetEnv VTS_HTML_ROOT /home/virtual/ssl/ssl/var/www/html
#
#     # Disable the ability to follow symlinks:
#     # users should use symlinks100.com/steedee instead
```

**Multi-site serving:** configuring virtual hosts in `httpd.conf` allows users to host many sites, even when they share the same IP address and port.

If a visitor navigates to a directory on your server, the default document in that directory is served. But to list the contents of that directory, enter:

```
<Directory /path/to/dir>
    Options +Indexes
</Directory>
```

Take care when activating this feature. Because the `Directory` block directive also affects all subdirectories, private areas of the server could be exposed to the public. Use the `Options -Indexes` directive in another `Directory` block further down the tree to stop these listings from being generated.

**Customising error pages:** If a visitor to your domain enters a URL to a non-existent file, typically a HTTP 404 (file not found) error appears in their browser. Wouldn't it be handy if the visitor could be redirected to the home page or, better still, a search page? This directive allows users to specify the error document to be replaced, as well as what page to serve. The following can be used to achieve the above solution:

```
ErrorDocument 404 /path/to/
404_error_file.html
```

Any error code can have a customised page in this manner. Make sure error pages are larger than 512 bytes; Internet Explorer displays its own "Friendly HTTP Error Message" if this isn't done. More details about customising error pages can be found at [www.apcmag.com/info/ms294807](http://www.apcmag.com/info/ms294807).

## In this series . . .

Part 1 – July  
Installing the Apache  
Web Server

Part 2 – August  
Getting Apache to do  
what you want

Part 3 – September  
Apache's security  
unlocked

Part 4 – October  
Apache's new  
features

Part 5 – November  
Troubleshooting

## Inside info

- The Apache HTTP Server Project  
<http://httpd.apache.org>
- Apache 1.3 documentation  
<http://httpd.apache.org/docs>
- Apache 2.0 documentation  
<http://httpd.apache.org/docs-2.0>

# Work that BOOT.INI

Lachlan Grant describes the switches in the BOOT.INI file, and how they can be employed to troubleshoot problems.

Residing in the root directory of the Windows partition and hidden by default, the BOOT.INI file tells the boot loader where to find system files and, in the case of dual boot machines, how to start up different OSes.

However, most Windows users probably aren't aware that there are several other switches that can be added to BOOT.INI to make it perform other tasks. These are useful for customisations and troubleshooting problem installations.

## THE SYSTEM CONFIGURATION UTILITY

There are two ways you can edit the BOOT.INI file. Experienced NT and 2000 users should be familiar with the old-fashioned way — turning the "hidden" attribute of BOOT.INI off and editing it in an application such as Notepad. However, it's easier to use the System Configuration Utility, which ships with Windows XP and Server 2003. This utility can prevent a number of simple mistakes that could wreak havoc on the next reboot. Start it up by clicking Start > Run and typing **MSCONFIG**.

The System Configuration Utility also makes and manages backups of your original file, so if something goes wrong you can always revert back to your original settings.

### Skill level

#### Beginner

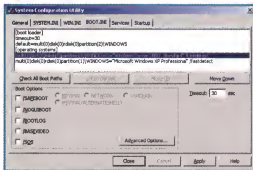
Elementary Windows experience needed.

### Requirements

Windows XP or Server 2003.

### Time to complete

Less than 1 hour.



**Easy does it:** System Configuration Utility takes the pain out of editing BOOT.INI.

## ADVANCED OPTIONS

After toying with basic switches, click on the Advanced Options button. A number of more technical switches are available:

**/MAXMEM=number** specifies the amount of RAM (in megabytes) that Windows may use.

**/NUMPROC=number** specifies the number of processors that Windows can use in a multiprocessor system.

**/PCIOLOCK** stops Windows from dynamically assigning hardware input, hardware output and interrupt request resources to PCI devices in x86-based systems. This leaves the BIOS to configure the devices.

**/DEBUG** enables the kernel debugger when Windows starts. Debugging is only activated by a remote debugging device attached to a serial port.

## SHIFTING INTO MANUAL

If you're game enough to directly edit the BOOT.INI file, there are a few more switches to try.

Instead of turning BOOT.INI's hidden attribute off and opening it in Notepad, it's a lot easier to open it up through your System Properties. To do this, right-click My Computer and select Properties. On the Advanced tab, click on Settings under Startup and Recovery > Edit. Back up the BOOT.INI file before making any changes.

Here are some extra switches you can type in:

**/FASTDETECT=com: <number>** turns off serial and bus mouse detection for the specified serial port, where number refers to your serial port numeration (COM1 is 1, COM2 is 2 and so on). If you use **/FASTDETECT** without specifying a serial port, mouse detection will be turned off on all communication ports.

**/KERNEL=filename** defines the kernel that is loaded at startup, where filename is a valid kernel in your System32 folder (that is, NTKRNLMPEX.E).

**/BURNMEMORY=number** specifies the amount of memory (in megabytes) that Windows can't use. **/CRASHDEBUG** turns on the kernel debugger when Windows starts. Like **/DEBUG**, this switch remains inactive until a Stop error occurs.

**/HAL=filename** defines the hardware abstraction layer (HAL) loaded on startup, where filename is a valid HAL file in your System32 folder (such as HAL.DLL).

**/PAE** permits a system that supports Physical Address Extension (PAE) mode to start normally.

Although these switches enable you to speed up and/or troubleshoot your system, take care when using them. A simple spelling mistake while editing the BOOT.INI with a text editor can stop Windows from booting altogether. **FILE**

**/SAFEBOOT** Windows boots in safe mode only.

**/NOGUIBOOT** prevents Windows displaying the startup bitmap and progress bar.

**/BOOTLOG** turns on boot logging to the text file NTBTLOG.TXT in your system root directory (C:\WINDOWS).

**/BASEVIDEO** forces Windows to use the standard 640 x 480 16-colour VGA mode. If used with the **/SOS** switch, you can determine which driver is triggering the failure.

**/SOS** displays the device drivers as they load during Windows startup.

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# Visual voodoo

Asher Moses moves beyond mere frames per second and reveals a variety of ways to help maximise the performance of your PC's graphics subsystem.

Reducing a game's visual splendour so that it approximates that of Wolfenstein 3D is hardly a worthy compromise to get ludicrously high frame rates or produce high scores in synthetic benchmarks. If you focus on areas ranging from basic screen setup all the way to overlocking, it's possible to strike the perfect balance between performance and image quality.

## THE BIOS

Even before entering Windows, a number of tweaks can be performed to optimise a computer's video performance:

**AGP Aperture Size:** usually located in Advanced Chipset Features, this is the amount of main memory allocated to the AGP device for use when video memory is running low. As a general rule, the AGP Aperture size should be set to half that of your system memory.

**AGP Mode:** this controls the transmission rate of the AGP bus (for instance 1x/2x/4x/8x). Find out which transmission rate your graphics card supports (most current cards support up to 8x), and ensure that this is mirrored by the AGP mode for maximum performance.

**AGP Fast Writes:** by enabling this option, video card memory is written to directly, rather than forcing data to go through the system bus. This gives a small performance boost.

**AGP Sideband Addressing:** provides additional channels for transmitting data requests between the graphics processor and the system. Enable this for a slight increase in performance.

**AGP Voltage:** allows users to adjust the voltage being supplied to the AGP card. Raising the voltage allows for higher clock speeds while overlocking; however, it also increases the video card's heat output.

## SCREEN SETUP

Firstly, ensure the monitor is set up correctly as all tweaking efforts will be in vain if it isn't displaying images optimally. The primary goal of screen calibration is threefold: to

ensure that differences between tones are clearly discernible (contrast), that colours are rich and realistic, and that shapes are displayed properly.

This issue is particularly important for graphic designers — it's astounding to see how different an image can look on someone else's monitor. The main culprit is the gamma setting, which dictates how a monitor interprets brightness and contrast information from a video card. Gamma levels in Windows default to 2.2, while Macs default to 1.8.

Correcting this isn't as easy as adjusting the driver gamma settings because brightness, contrast and colour balance levels all need to be accurately set on the monitor. A concise guide for calibration is located on the Bryce Alive Web site (<http://bryce-alive.net/calibrate>).

DisplayMate ([www.displaymate.com](http://www.displaymate.com)) is another tool that helps with calibration, assisting with colour balance, gamma settings and screen geometry (APC uses DisplayMate to properly set up any screen before it's reviewed). DisplayMate will set you back a hefty US\$68, but your eyes will thank you for the investment.

## A REFRESHING CHANGE

Possibly the most debated 2D visual option in Windows XP is ClearType, Microsoft's answer to the issue of aliasing in text. ClearType text initially seems slightly blurred, but over time appears much clearer. To witness the difference for yourself, go to Control Panel > Display > Appearance > Effects > ClearType.

If your eyes get sore after long periods of PC use, the monitor's refresh rate is probably set too low (the default for Windows XP is 60Hz). To manually set the refresh rate, head to Control Panel > Display > Settings > Advanced > Monitor and choose a higher setting. If the setting is too high, Windows automatically reverts to the previous setting.

Next, reboot and check your refresh rate again. There's a planned "bug" within Windows XP whereby the refresh rate automatically reverts back to 60Hz upon reboot if you're playing a game or using an Open GL or Direct 3D program. If this occurs, go Start > Run, and enter `dxdiag`. Click on More Help > Override and enter a manual value.

## SPEEDING UP THOSE GAMES

Once a system's been tweaked for optimal visual performance under general usage conditions, move on to settings that affect the 3D/gaming performance. Most of these adjustments appear under Display Properties > Settings > Advanced.

The most crucial setting is the VSync function. Vertical Synchronisation forces the graphics card



## Bonus CD software

PowerStrip 3.49 • Riva Tuner • 3DMark2003 • Rage3D Tweak.

## Skill level

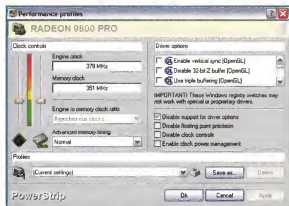
**Intermediate**  
BIOS configuration  
experience needed.

## Requirements

Nvidia or ATI graphics  
chipset; Windows XP  
required for 3D tweaks.

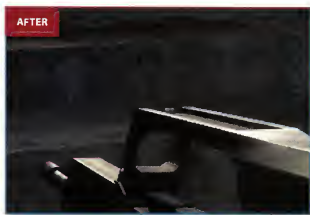
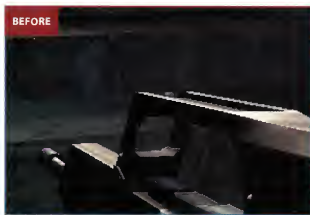
## Time to complete

**1 hour (approx)**



**Power up:** PowerStrip is a useful system overclocking tool for boosting video performance.





See the difference: enabling anti-aliasing and anisotropic filtering gives you a much sharper image.

to render frames at the same speed as the monitor. When enabled, this more often than not results in reduced frame rates. Unless you experience tearing issues, make sure this is set to Always Off under both the Direct3D and OpenGL tabs. On the off-chance that tearing does occur, turn VSync back on and ensure that the refresh rate is adjusted properly, as previously described.

Since current and even previous generations of graphics chipsets are more than capable of running any game without breaking a sweat, the opportunity to play with high levels of anisotropic filtering (AF) and anti-aliasing (AA) has become far more widespread.

Anisotropic filtering increases the sharpness of distant textures, while anti-aliasing smoothes out the jagged, pixelated edges of angled polygons. Both result in a crisper, smoother image, but give a slight performance hit. Experiment to achieve a balance between performance and image quality. For the best visual performance, 8x AF and 4x AA should be used. To illustrate the difference in image quality, the above screenshots were taken in Far Cry before and after 8x AF and 4x AA were enabled.

Finally, there are myriad hidden tweaking options that can be enabled through third-party add-ons such as Rage3D Tweak for ATI users and Riva Tuner for Nvidia users (both are included on this month's cover CD set). Once installed, both utilities can be accessed via an extra tab within the Advanced Display Properties.

While explaining Rage3D Tweak and Riva Tuner thoroughly is a whole other Workshop, most settings are optimised for the best balance between image quality and performance by default. Experiment with the various options to find the best combination for your system.

#### SOMETHING FOR NOTHING

Significant performance gains can be achieved by overclocking the video card. As a general rule,

overclocking the memory gives a greater performance boost because it increases the rate that polygons can be filled with textures. Remember that overclocking voids a video card's warranty and can permanently damage a system if it's not done properly.

A variety of software enables clock speed adjustment within Windows. Entech's PowerStrip (<http://entechtaiwan.net/util/ps.shtml>) is highly recommended.

There are a plethora of tweaks available under PowerStrip but, apart from Clock Controls, this Workshop has already covered most of its other settings. To get to the Clock Controls panel, right click on the PowerStrip icon in the system tray, then go to Performance Profiles > Configure.

The two sliders allow for the adjustment of the video card's core and memory clock speed. The optimum performance figure is dependent on the graphics chipset, quality of memory chips and the cooling solution used.

Try increasing the memory and core clock speed in 5MHz increments until screen artefacts or lockups become evident. Once this happens, set it back to the last stable speed and run a burn-in test using a graphics-intensive benchmark such as 3DMark2003.

To demonstrate how much performance can be improved by performing the tweaks listed above, 3DMark2003 and UT2003 benchmarks were run at 1,024 x 768 with 4x AA and 8x AF enabled on a Radeon 9800 Pro graphics card.

The base system consisted of a Pentium 4 2.4GHz Abit 157, 1GB OCZ DDR400, 120GB Seagate Barracuda Parallel ATA hard disk drive and the aforementioned Radeon 9800 Pro graphics card. The "after" figures have video card overclocked to 440/370MHz (core/memory) over the default speed of 380/340MHz.

The resulting performance boost should be welcomed by everyone. **EDIT**

## Results

### ■ Unreal Tournament 2003

Before

150.2fps 200fps

After

165fps 200fps

### ■ 3DMark2003

Before

5,230 10K

After

6,112 10K

## Drivers

Before performing any of the tweaks listed in this guide, it's important that the video card's most up-to-date drivers are installed. These can be found on the card manufacturer's Web site, or on the site of the company that manufactures the graphics chipset (Nvidia, ATI, Matrox and so on). Updating drivers is one of the quickest and easiest ways to squeeze extra performance out of a video card and it's not unusual to see an improvement of as much as 20%.



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# 50 Fast Windows XP Techniques

Every operating system has plenty of features considered too technical for inclusion in an introductory text, yet once they're explained they're very useful and often surprisingly easy to use.

This is exactly the type of material covered by *50 Fast Windows XP Techniques*. Topics include managing startup items, customising the taskbar, using the accessibility features, enforcing password rules and preventing pop-ups. The techniques are well chosen, and while it might be unreasonable to expect all 50 to be relevant to every reader, most readers should be able to apply a majority.

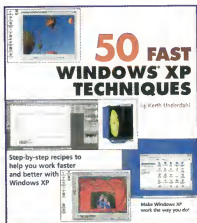
The publisher's claim that "you can learn [the techniques] in minutes and use them to save hours" sounds like hyperbole — after all, futz with Windows skins wastes time rather than saving it — but learning how to optimise notebook battery life, manage system services and use system restore points can reduce unproductive time. Even small benefits accumulate: saving one minute a day by using the quick launch toolbar yields six hours per year.

The instructions are presented in a clear, step-by-step form, with plenty of illustrations and a simple notation for menu and other commands. Supplementary material is presented in breakout boxes to reduce the risk of confusion.

However, the way Windows XP uses colour results in greyscale screen shots that appear muddy and lacking in contrast, even if they are well reproduced. Colour printing would make a huge difference to the clarity of these images.

For those who are generally comfortable with XP and ready to start making it work the way they want, this book covers useful territory without being over-technical or excessively detailed. It avoids the common mistake of rehashing the absolute basics of Windows operation. Advanced users will be familiar with much of the material, so this book's true audience is beginners to intermediate users, not beginners to advanced as it suggests.

Stephen Withers



## Details

Publisher	Wiley
Price	\$38.95
ISBN	0764558234

## IT Project Management

Exam guides are usually informative but uninspiring. However, *IT Project Management* is a fascinating read. It covers all exam objectives for CompTIA's IT Project+ certification and adheres to the US Project Management Body of Knowledge standard (PMBOK), which is the basis for certification by the Project Management Institute and many other international organisations.

Topics include defining a project goal, determining feasibility and establishing priorities, determining strategy and obtaining funding, working with management, organising a team, resolving disagreements and feature creep, tracking progress, and maintaining leadership. Much of this is standard project management fare, but the author injects a clear and relevant IT focus in every stage.

Each step of the typical project management process is gently walked through. Practical case studies and interviews abound, and each chapter concludes with a quiz and exercises.

Those studying for CompTIA certification would do well to consider this book; it offers sound guidance and the accompanying CD includes a simulated exam. Those not seeking certification will also find plenty of value here. In the modern economy, IT professionals can no longer concentrate on purely technical pursuits and must develop "soft" skills.

*IT Project Management* is a definitive guide to the topic and a must-read for anyone involved in the field.

David Williams



## Details

Publisher	Osborne/McGraw-Hill
Price	\$75.50
ISBN	0072232021

## Programming Multiplayer Games

Doom, Quake, Call of Duty — all are popular multiplayer games and many a person has dreamed of coming up with the next winner. That's why the title of this book is a masterstroke of marketing simplicity, sure to capture the attention of many.

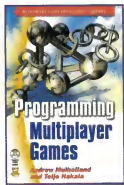
Yet it fails to impress from the outset. The book is specifically about programming online, Web-based multiplayer games, so any visions of producing the next Quake immediately go out the window. That said, the authors present their formula for successful code-cutting with TCP/IP sockets, MySQL and PHP4, all of which are popular technologies freely accessible to any programmer.

However, it's not until two-thirds of the way through the book that the mechanics of a sample game are discussed. Rather, the bulk of the text is dedicated to tutorials on PHP and MySQL and a very lengthy custom network library. The value of these tutorials is dubious; for instance, the eventual game uses a database to facilitate online chat between players in the "pre-game lobby" rather than save the status of a game.

What's more, the game itself doesn't use PHP. It uses TCP/IP out of necessity, but the amount of space devoted to a custom library of routines makes little sense, especially when the network library produced has no special game-oriented functionality.

*Programming Multiplayer Games* serves as a good introduction to a multitude of technologies, but fails to realise its potential.

David Williams



## Details

Publisher	WordWare Publishing Inc.
Price	\$109.95
ISBN	1556220766

## Dreamweaver MX 2004: A Beginner's Guide

Dreamweaver in its latest form is actually several advanced programs rolled into one, so *A Beginner's Guide* is an ambitious undertaking. Ostensibly a collection of essential skills for using Dreamweaver MX 2004, Macromedia's ever-popular Web authoring application, the book also delves into related subjects such as server programming and SQL database interaction.

The authors are Web application developers who regularly push Dreamweaver to the limit. Unfortunately, this seems to prevent them from explaining the basic essentials, such as page design and styling, while labour-saving methods that really only apply to advanced users are discussed. So despite its title, *A Beginner's Guide* is better suited to experienced persons migrating or upgrading to Dreamweaver MX 2004.

However, individual page construction isn't totally overlooked. The basics of table layout, templates and Dreamweaver objects are covered, as are the details of

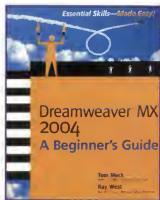
setting up and managing a collection of files to be used together as a Web site. Noticeably absent is coverage of Dreamweaver MX 2004's new and improved CSS editing capabilities, and CSS in general.

As with all the *Beginner's Guide* titles, mastery checks and practical projects aim to engage the reader and allow them to gauge their own progress. The authors share a wealth of interesting tips along the way and include snappily designed project graphics, adding a professional touch.

Microsoft fans will be glad to see that all example code is written for ASP, although occasionally other languages are shown. A handy section on common ASP server errors is also included.

Overall, *Dreamweaver MX 2004: A Beginner's Guide* leans heavily on the whizz-bang aspects of Dreamweaver without covering them in detail, and suffers as a result. It isn't the lucid foundation you'd expect, but it's an enlightening read nonetheless.

David Emberton



### Details

Publisher	Osborne/McGraw-Hill
Price	\$49.95
ISBN	0072229969

## Macromedia Flash MX 2004: A Beginner's Guide

No clue what a key frame is? Never played with a timeline before? *Macromedia Flash MX 2004: A Beginner's Guide* promises to show you all this and more, breaking down all the core topics of Web-based animation and making them easy.

As its title suggests, this book is written for those with little or no Flash experience. That's why the author intersperses practical, step-by-step instructions with Flash trivia and quizzes to check a reader's progress. And as with all *Beginner's Guide* books, there's no shortage of tips and screenshots to break the monotony of learning often dry technical subjects.

The book assumes nothing and sticks to the true basics, but doesn't include a lot of aesthetic sensibility either. The sample graphics and animations look terrible, which is a shame.

It does, however, fulfil its promise of covering the essentials of Flash — just not necessarily Flash MX 2004. The majority of the material presented applies

equally to past versions of the program, and very few MX 2004 features are specifically included.

This doesn't make the book any less relevant for beginners, just diminishes its justification for carrying a new-title price tag when so many older and cheaper sources of the same information remain available.

However, if you'd rather not dig around in the bargain bin this book gives you all you need to build graphics, simple animations and interactive multimedia with Flash. ActionScript programming is left to the end, although each section is perfectly readable in isolation.

*Macromedia Flash MX 2004: A Beginner's Guide* is probably best suited to someone who's been assigned the task of editing existing Flash files at work, or for designers wanting to venture out of Photoshop for the first time. It's certainly an informative read but contains nothing that's truly new.

David Emberton



### Details

Publisher	Osborne/McGraw Hill
Price	\$49.95
ISBN	0072229829

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# Rise of Nations: Thrones and Patriots PC

Play a king, a president or God in this virtual world of civilise and conquer.

*Justin Kranz jumps at the chance to rewrite history.*

The original Rise of Nations was an entertaining mix of real time strategy and Civilisation-style nation building. The expansion pack for RoN, *Thrones and Patriots*, introduces new features with effects that are less cosmetic and more oriented toward gameplay.

As the title suggests, statecraft plays an increased role here. Once a player's nation attains a certain level of sophistication, it has the ability to produce a senate. And contrary to its real-life Australian incarnation, the senate in *Thrones and Patriots* plays a vital part in the development of the fledgling nation-state.

From it comes the ability to select the type of government, from lily-livered democracy through to red-blooded dictatorship via monarchy and all other stops in between. Given our ongoing debate about a republic, this should resonate with Australians.

## CIVILISE OR DIE

Each style of government has its handicaps and benefits, depending on the demeanour of the civilisation you've created. Thrown into the mix is a government-controlled playing unit, the Patriot. Similar to the Hero units in *Warcraft III*, the Patriot isn't merely an all-conquering chess piece on the battlefield, it also has a positive effect on domestic resource production and troop morale.

The aim of the game is to advance a civilisation, via the exploitation of resources, military might and technological progress, to the point where it holds undisputed dominance

over the world. It works because the civilisations on offer make for great "what if" moments.

These civilisations consist of the Persians, two Native American tribes (the Iroquois and the Lakota), pre-War of Independence American settlers, and the Dutch. There's also an Indian nation, but the ability to outsource opponents into oblivion hasn't been included.

## CAMPAIGN FEVER

The centrepiece of the expansion pack lies in four new solo campaigns. Players have the option of stepping into the sandals of Alexander the Great, or slipping on a three-pointed hat and becoming Napoleon.

In both of these modes the player enters at a point in history when the subject was still rising in prominence. The challenge is to build a nation beyond the historical heights achieved by these all-conquering warriors.

The other two campaigns are a little more abstract. The *New World* plunges players into the fight for America and offers the chance to play as either the Native Americans, American settlers or a marauding European power.

Each side has its own criteria for victory in this mode, meaning that gamers can return several times and play through an entirely different experience. More limited is the Cold War scenario, which plays along predictable Soviet versus US lines.

The fact that you have to pay an extra \$50 for an add-on to the existing game means that while this may make Microsoft a little money,



*Denied: the Chinese bid for the Americas Cup retires in disarray.*

*Thrones and Patriots* won't attract an audience beyond existing hardcore *Rise of Nations* fans. This is a real shame, because it vastly improves what was already an outstanding title, and the latest inclusions really do add new dimensions to the game.

If you have a clique of friends who already enjoy battling it out in *Rise of Nations*, you'll know that there's no finer multiplayer experience for sheer enjoyment, as opposed to the insane win-at-breakneck-pace ethic of most leading RTS games. And while the new solo campaign modes are much more than mere icing on the cake, it's still the multiplayer crowd who will derive the most value from this.

## Details

Contact	Microsoft
Online	<a href="http://www.microsoft.com/games/thronesandpatriots">www.microsoft.com/games/thronesandpatriots</a>
Price	\$49.95
Verdict	●●●●●

PC

# True Crime: Streets of LA

The saying goes that there are eight million stories in the naked city. But that's New York. In True Crime's LA, there are a lot less, and you've seen them all before.

If we are what we eat, the main character in True Crime: Streets of LA, Nick Kang, has been ordering large serves of annoying prat to accompany steaming bowls of cliché soup. He has the smart mouth of a more obnoxious Mel Gibson circa *Lethal Weapon 2*, a one-time cop father who mysteriously disappeared a long time ago, and the compulsory friction with the rest of the force, especially his superior officers.

And of course, like any maverick LA cop worth his salt, Kang has repeatedly been in trouble for excessive violence and property damage. So much so that when the game starts, he's pulled off indefinite suspension to join the Elite Operations Division, confirming the long-held belief of many that to effect a rapid advance through the ranks of the LAPD, a healthy streak of brutality is needed.

## THE HIGHEST FORM OF FLATTERY

Back on the street, Kang spends his time driving very fast, completing mission-based cop assignments and beating people up, all from a third-person perspective. Sound familiar? That's because developers Luxoflux display no shame when it comes to ripping off the style and gameplay of the outstanding Grand Theft Auto 3/Grand Theft Auto: Vice City games.

There are, however, many potholes in this approach, and they are exacerbated by the fact that the formula has already been done better elsewhere. The higher resolution and detail afforded by PC video cards and monitors over a console and TV setup, for instance, highlight some rough and rugged texturing that would have been concealed on a TV. The lines of vehicles and buildings are too geometrically precise, the environments too sterile.

Character models are very well animated, though, and there's an acceptable level of detail in the main cast. But the generic appearance of both thugs and civilians tends to anchor players firmly in their seats in front of their computers, rather than the virtual streets of LA.

Despite this, investing a few hours in play shows that the strong focus on plot easily overwhelms any misgivings about the game's appearance. The trouble is that the ridiculously complex control scheme, which is the very

definition of diabolical, yanks players out of any immersive experience. There are keys to arrest people, keys to flash a badge, keys to use a tranquilliser gun... there are keys for everything. And there's no option for using a joystick controller, it's keyboard and mouse control only.

If the game unfolded in a more deliberate manner, then perhaps the number of control options could be justified. But the pace is quite frenetic — drive to a location, get out and be in the thick of the action. There is simply no time to think about all of the valid options Kang has in a situation — it's mental overload, not fun.

This level of confusion extends to the game's multiplayer modes. These are a good concept, but losing games online because you're constantly checking which key does what makes for a baptism of fire.

The developers' defence centres largely on the fact that they have created a marvellously realistic model of the city. Which is fantastic for anyone studying up to become a taxi driver in the City of Angels, but in practice makes little impact on the 99% of local gamers who aren't familiar with LA or simply don't care about such features. And if authenticity were the main aim, maybe those legendary LA traffic jams should have been more in evidence, because the in-game roads are quieter than the main drag of Woop Woop on a wet Sunday morning.

## ALL-STAR CAST

One possible reason for the empty streets is that everyone is too busy recording audio for the game. True Crime trumps any competing title both in its soundtrack, which is loaded with hot hip-hop tracks, and its voice talent.

Russell Wong, who appeared in *Romeo Must Die* and *The Joy Luck Club*, plays Kang — and he's a comparative minnow. Also featuring prominently are the star of *Girlfight* and *S.W.A.T.*, Michelle Rodriguez, Quentin Tarantino



5, 6, 7, 8: "The first rule of Bollet Club is... there is no Bollet Club."

favourite Michael Madsen, *Pearl Harbour* star Mako and ubiquitous character actor Ron Perlman. And then there are the really big guns: Gary Oldman and Christopher Walken.

The casting of roles for this goldmine of talent ranges from predictable to opportunity lost, and is best typified by Rodriguez and Walken. Rodriguez plays Rosie, Kang's feisty Latina sidekick. As such it's hardly a stretch, unlike Walken, who has been bizarrely cast in the role of comforting mentor to Kang, where he offers sage advice, platitudes and little more. It's ironic that a video game purporting to show LA's grittier side has removed all traces of Walken's trademark menace and quirkiness.

True Crime: Streets of LA is a calculated attempt to cash in on the rampantly successful Grand Theft Auto titles, but it just falls short in virtually every key area of comparison with the exception of sheer ambition, as evidenced by the stellar cast doing the voices.

Keep in mind, though, that even GTA's first couple of titles were largely derivative and uninspired. A sharpening of the controls, a fresh lick of paint and some tape across the main character's mouth could make True Crime: Streets of LA something really special.

## Details

Contact	Activision
Online	www.truecrimela.com
Price	\$89.95
Verdict	●●●●●

XBOX

# Ninja Gaiden

"Wow, Ninja Garden!" you gasp. "Finally a game that manages to merge the arcane worlds of bonsai and bushido!"

Alas, no. This is *Ninja Gaiden*, a radical modern overhaul of a classic ninja-based action game as opposed to a brave foray into the criminally under-represented world of combat horticulture. But that's where the bad news ends and the good times begin.

This is one super-slick game. Players who remember the original *Devil May Cry* will be in familiar territory here. That game broke new ground for third-person survival horror titles with its lightning speed and outstanding visuals. *Ninja Gaiden* features a slightly upgraded graphic engine, game interface and control mechanism, and instead of DMCs undead-slaying bad-ass as the protagonist you have Ryu Hayabusa.

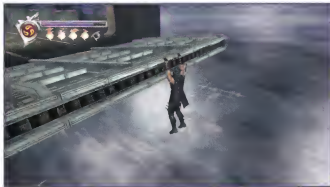
Apart from sharing his name with a very fast motorcycle, Hayabusa is a "good" ninja, the possessor of the Dragon Sword, tasked with defeating the evil deities of the Vigor Empire.

This back story isn't the only complex thing about *Ninja Gaiden*. It soon becomes apparent that Ryu possesses formidable ninja skills which

he uses to cavort acrobatically around exceptionally well-modelled Oriental environments, dishing out carnage to the forces arrayed against him. Those forces initially start out as hordes of evil ninjas, and as the game progresses they take a spookily demonic turn. There's not much plot exposition here, because at its heart this game is pure action.

Special mention must be made of the excellence of the control system. In no time at all beginners will be able to perform satisfyingly complex jumps and sideways-wall-running moves with ease, to the extent that they become natural. Ditto for combat. Apart from the movement controls, only two buttons are used — either tapped singly, in sequence, or together. Yet it's never repetitious or boring.

Perhaps the best compliment that can be paid to *Ninja Gaiden* is that watching someone else play it makes you want to deal them a swift kick where it hurts and take over.



**Frequent flyer:** you get what you pay for with these new budget airlines, Ryu discovers.

The Xbox Live component also comes into its own here, with downloadable content and competitive online play available. Players even get the older *Ninja Gaiden* games as unlockable bonuses in-game.

A great all-round title that plays to its strengths in control and visual output, *Ninja Gaiden* is ideal for gaming's newcomers and true believers alike. The bonsai can wait.

## Details

Contact	Microsoft
Online	<a href="http://www.ninjangaidengame.com">www.ninjangaidengame.com</a>
Price	\$99.95
Verdict	●●●●●

PS2, XBOX

# Van Helsing

Cashing in on the recent movie, this yet another jaunt through a maze of haunted houses from a third-person perspective. Everyone from *Frankenstein* to *Dracula* gets a run here, and the poetic licence runs thick even as the plot sensibility gets anorexia-thin.

Like *Ninja Gaiden*, *Van Helsing*'s style of action takes its cues from the game that rewrote the genre, *Devil May Cry*. However, this is a paler imitation that suffers in comparison with both of those titles.

The camera control is the most glaring deficiency, with the set angles for each room doing a great job of making the environments look good, but often proving impractical in the heat of combat. Getting a lovely profile shot of *Van Helsing* filling the screen doesn't work that well when he is surrounded on three sides by enemies pummeling the stuffing out of him — especially when they are obscured.

The dedicated work their way around

the camera issue — the solution is generally to bolt to the next camera hotspot for a more panoramic view of the melee. Yet by the time a player masters this hit-and-run technique, they will have a few seriously powerful weapons in their arsenal that can clear a room with a spin in a random direction.

The problem is, once this stage is reached, the incentive to keep playing just nosedives. Having powerful weapons is fun, sure, but a more sustained challenge needs to accompany them. This is the type of issue that gameplay testers are meant to catch long before a title goes on the market, but it seems as if the development team were happy to let that one go through to the 'keeper.

While there's nothing glaringly wrong with *Van Helsing* with the exception of the camera angle complaint, this inconsistency in the degree of difficulty in the middle and late stages does tend to sap excitement levels.



**Scare-crow:** someone was going to pay for making him wear that hat.

For those people who must see the movie, then play the game, try visiting the video shop for a pre-purchase rental. The movie isn't a total turkey, just a bit disappointing — a pretty fair description of the accompanying game.

## Details

Contact	Vivendi Universal
Online	<a href="http://www.vanhelsinggame.com">www.vanhelsinggame.com</a>
Price	\$99.95
Verdict	●●●●●



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## Voice over IP missile lock

People Telecom has announced the arrival of home Internet telephony, with call rates that will create ripples in the marketing departments of major telcos.

Although final call rates were still being finalised at the time of publication, a trial of the new People Telecom service offered rates of 6c/min to the USA, UK, China, and 10c/min to countries such as Greece and Korea. Local calls were 15 cents flat rate, national calls 6c/min, and calls to other People Telecom VoIP users free. In the pilot, a monthly charge of \$2 applied.

"As far as we know, we're the first company offering residential Voice over IP in Australia," said Nathan Hodges, marketing director for People Telecom. "People are paying too much for telephony at the moment, and we want to try to offer better value, which will also encourage uptake of broadband."

The service uses an IP telephone — essentially a telephone with an Ethernet cable that plugs into an ADSL modem/router rather than a phone plug on the wall. But unlike the Internet calling handsets that have traditionally been used in conjunction with the SIP protocol, People Telecom will issue a real PSTN telephone number in your local calling area that people with a normal landline telephone can call.

IP phones sold in Australia to date have cost around \$190, but People Telecom says it's looking

at the option of subsidising handsets to make it easier for people to take up the service.

The VoIP service will be offered under the Swiftbroadband brand, the progeny of the marriage of Western Australia-based ISP Swiftel with Sydney-based People Telecom.

The company says it has no plans to offer VoIP to users of other ISPs at this stage, because it wouldn't be able to assure quality of service. It's using VoIP gateways installed at local points of presence (POPs) in each state, and coupled with a minimum 512Kbit/s ADSL connection, the company says users won't experience the delay issues sometimes associated with Internet calling.

The company's new telephony services will allow People Telecom to compete with Optus, Telstra and iiNet, which all bundle some telephony with their broadband services.

"Voice quality is the same as a normal phone," said one participant in the company's VoIP pilot run. "The only difference is that it takes a few seconds for it to start ringing, but other than that it was perfect."

For more information about the new service, refer to People Telecom's Swiftbroadband Web site at [www.swiftdsl.com.au](http://www.swiftdsl.com.au).

## Unwired pricing announced

Major new wireless ISP Unwired has announced pricing for its broadband Internet access, which currently covers Sydney but will spread across Australia in coming years.

As previously reported in APC, prices are just above OzEmail's. An entry-level 300MB 256Kbit/s plan costs \$34.95 per month, a 10GB 512Kbit/s plan costs \$89.95, and a 10GB 1Mbit/s plan is priced at \$119.95. The wireless modem costs \$189 on a 12-month plan. Full pricing is at [www.unwired.com.au/unwired/plans.php](http://www.unwired.com.au/unwired/plans.php).



Thumbs up: Unwired offers a variety of wireless broadband plans.

## Your monthly guide to the best deals

APC is proud to join with the independent broadband monitoring service Broadband Choice (<http://broadbandchoice.com.au>) to bring you the best broadband deals every month.

The comparison table on the following page focuses on ISPs that best serve the majority of APC readers' needs. These include coverage in Melbourne, Brisbane and Sydney; 1300, 13 or 1800 telephone support; contracts of 12 months or less; and five or more email addresses.

We've excluded ISPs that meter both uploads and downloads and only listed those that meet at least three of our four plan selection criteria:

- Budget plan: cheapest deal under \$45.
- Light plan: cheapest deal under \$70, with at least 512Kbit/s speed and 1GB data.
- Family plan: largest download allowance under \$90, at least 512Kbit/s and 5GB data.
- High speed: cheapest 1.5Mbit/s plan under \$160, with 4GB minimum.

If an ISP has "unlimited downloads" but speed is throttled after reaching a certain limit, the portion in which you can get full-speed downloads is listed as their limit.

We've picked the lowest price for a contract period of six months or less for broadband installation. Otherwise, the lowest priced option was selected. The installation price doesn't include a modem because you'll generally get better value buying a modem separately. See [www.apcmag.com/web/\\_0/GetRouted/](http://www.apcmag.com/web/_0/GetRouted/) for advice on choosing a modem/router.

Can't find your provider in our list? That's because some of the largest ISPs, and many smaller ones, didn't meet our selection criteria.

ISPs enter their own information into the Broadband Choice database. ISPs can contact [bc@whirlpool.net.au](mailto:bc@whirlpool.net.au) for more details.

Data was extracted from the BroadbandChoice database on 9 June 2004.

## Wireless modem for \$249

D-Link's new DSL-G604T modem is a "one stop shop" for new ADSL users, offering a built-in ADSL modem, four port network switch and 802.11g wireless networking, as well as integrated Internet connection sharing capabilities. And it's only \$249, down \$100 from its predecessor.

D-Link says it will release a firmware update for the modem to be DSL2+ capable in the near future, so that ISPs with DSL2+ DSLAMs such as Internode and TransACT can start offering ADSL at speeds of up to 24Mbit/s.

# BROADBAND DIRECTORY

Name	Phone	Online	Budget plan (under \$45)	Light plan (under \$70, at least 512Kbit/s, minimum 1GB data limit)	Family plan (under \$90, at least 512Kbit/s, minimum 5GB data limit)	High-speed plan (under \$150, at least 1.5Mbit/s, minimum 4GB data limit)
AAPT smartsat	13 88 88	http://aapt.com.au	\$29.95* 200MB 256Kbit/s	\$69.95† 12GB 512Kbit/s	\$69.95† 12GB 512Kbit/s	\$99.95† 12GB 1.5Mbit/s
Ace Online	1300 721 146	http://www.aceonline.com.au	N/A	\$69.95* 2GB* 512Kbit/s	\$84.95* 8GB* 512Kbit/s	\$129.95* 4GB* 1.5Mbit/s
AOL Primus	1800 265 777	http://aol7.com.au	\$29.95* 200MB 256Kbit/s	\$69.95 1GB 512Kbit/s	N/A	\$149.95 5GB 1.5Mbit/s
Austroline Internet Solutions	1300 887 877	www.aits.com.au	\$24.95* 200MB 256Kbit/s	\$59.95* 5GB 512Kbit/s	\$84.95 No limit 512Kbit/s	\$139.95* 5GB 1.5Mbit/s
Australis Internet	1800 286 871	www.australis.net	\$29.95* 200MB 256Kbit/s	N/A	\$79.95 25GB 512Kbit/s	\$129.95 35GB 1.5Mbit/s
Big Blue	1300 791 789	www.bigblue.net.au	\$24.95* 200MB 256Kbit/s	\$49.95* 4GB 512Kbit/s	\$69.95* 20GB 512Kbit/s	\$79.95* 5GB 1.5Mbit/s
Bizmail Broadband	1300 797 774	www.bizmail.com.au	\$29* 250MB 256Kbit/s	\$49* 4GB 512Kbit/s	\$77 No limit 512Kbit/s	\$89* 10GB 1.5Mbit/s
Bullet Internet	1300 137 454	www.bullet.net.au	\$44.95* 500MB* 256Kbit/s	\$59.95* 3GB* 512Kbit/s	\$69.95* 10GB* 512Kbit/s	\$129.95* 10GB* 1.5Mbit/s
Comcon Internet	1300 302 324	www.comcon.com.au	\$24.95* 200MB* 256Kbit/s	\$59.95 10GB 512Kbit/s	\$79.99 No limit 512Kbit/s	\$89.95* 5GB* 1.5Mbit/s
ComeOnAussie.net	1300 361 317	www.comeonaussie.net	\$24.95* 100MB 256Kbit/s	N/A	\$89.95 25GB 512Kbit/s	\$119.95 35GB 1.5Mbit/s
Carl Internet	1300 135 908	http://curl.com.au	\$24.95* 200MB 256Kbit/s	N/A	\$79.95 25GB 512Kbit/s	\$149.95 No limit 1.5Mbit/s
DART Internet	1300 305 113	www.dart.net.au	\$26.95* 200MB 256Kbit/s	\$55 4GB 512Kbit/s	\$90 24GB 512Kbit/s	\$95 4GB 1.5Mbit/s
Diskum Internet	1300 663 400	www.diskum.net.au	\$29.95* 200MB 256Kbit/s	\$69.95* 2GB 512Kbit/s	\$79.95 No limit 512Kbit/s	\$119.95 No limit 1.5Mbit/s
E-SOUL	1300 367 258	www.e-soul.net	\$20.80* 100MB 256Kbit/s	\$49* 1GB* 512Kbit/s	\$78.80 No limit 512Kbit/s	\$89* 8GB* 1.5Mbit/s
E-Tel Communications	1800 733 888	www.e-tel.com.au	\$24.95* 100MB 256Kbit/s	\$59.95* 10GB 512Kbit/s	\$76.95 No limit 512Kbit/s	\$99.95* 12GB 1.5Mbit/s
Everlast Internet	1300 764 868	www.everlast.net.au	\$23.95* 100MB 256Kbit/s	N/A	\$79.95 No limit 512Kbit/s	\$109.95 20GB 1.5Mbit/s
Global Dial	1300 130 710	www.globaldial.com	\$34.95* 200MB 256Kbit/s	\$59.95 4GB* 512Kbit/s	\$79.95 16GB* 512Kbit/s	\$89.95 5GB* 1.5Mbit/s
GoTalk	1800 468 255	www.gotalk.com.au	\$19.95† 200MB 256Kbit/s	N/A	\$89.95† No limit 512Kbit/s	\$129.95† 15GB 1.5Mbit/s
IDXnet	1800 617 292	http://idx.com.au	\$29.95* 200MB 256Kbit/s	\$59.50* 8GB 512Kbit/s	\$79.50 No limit 512Kbit/s	\$110* 20GB 1.5Mbit/s
ILNet	13 19 17	http://www.ilnet.net.au	\$24.95* 200MB 256Kbit/s	\$59.95 4GB* 512Kbit/s	\$79.95 16GB* 512Kbit/s	\$89.95 5GB* 1.5Mbit/s
Internode	1300 788 233	http://aas.linternode.on.net	\$29.95* 300MB 256Kbit/s	\$59.95 12GB 512Kbit/s	\$79.95 32GB 512Kbit/s	\$89.95 12GB 1.5Mbit/s
Interworks	1300 720 207	www.interworks.net.au	\$29.95* 200MB 256Kbit/s	N/A	\$84.95 25GB 512Kbit/s	\$119.95 35GB 1.5Mbit/s
KeyPoint	1300 550 550	www.keypoint.com.au	\$39.95* 400MB 256Kbit/s	\$59.95* 4GB 512Kbit/s	\$89.95 No limit 512Kbit/s	\$99.95* 10GB 1.5Mbit/s
Nella Networks	1300 884 638	www.nella.net.au	\$29.95* 200MB 256Kbit/s	\$69.95 No limit 512Kbit/s	\$69.95 No limit 512Kbit/s	\$148.95 20GB* 1.5Mbit/s
Netspace	1300 360 025	www.netspace.net.au	\$29.95* 300MB 256Kbit/s	\$49.95 3GB* 512Kbit/s	\$89.95 25GB* 512Kbit/s	\$79.95 4GB* 1.5Mbit/s
Optazweb	1300 730 720	www.optazweb.com.au	\$21.95* 200MB 256Kbit/s	N/A	\$79.95 No limit 512Kbit/s	\$129 10GB 1.5Mbit/s
OptusNet Cable	1800 504 504	http://broadbandsales.optus.net.com.au	\$39.95† 300MB 10Mbit/s	\$49.95† 1GB 10Mbit/s	\$64.95† 12GB 10Mbit/s	\$64.95† 12GB 10Mbit/s
OptusNet DSL	1800 700 606	http://broadbandsales.optus.net.com.au	\$39.95† 300MB 512Kbit/s	\$49.95† 1GB 512Kbit/s	\$69.95† 12GB 512Kbit/s	\$118.95† 12GB 1.5Mbit/s
OzEmail Broadband	13 35 93	http://homesite.service.ozemail.com.au	\$29.95 300MB 256Kbit/s	\$64.95 12GB 512Kbit/s	\$64.95 12GB 512Kbit/s	\$99.95 12GB 1.5Mbit/s
Pacific Internet	13 36 35	www.pacific.net.au	\$44.95 1GB 256Kbit/s	\$54.95 No limit 512Kbit/s	\$54.95 No limit 512Kbit/s	\$149* 22GB 1.5Mbit/s
Shifireload	1300 736 623	www.shifireload.com.au	\$26.99* 200MB 256Kbit/s	\$66.95* 5GB 512Kbit/s	\$89.95 No limit 512Kbit/s	\$144.95* 5GB 1.5Mbit/s
Spin Internet	1300 303 375	www.spin.net.au	\$24.95* 200MB* 256Kbit/s	\$59.95 10GB 512Kbit/s	\$79.99 No limit 512Kbit/s	\$89.95* 5GB* 1.5Mbit/s
Swiftel	1300 360 197	www.swiftel.com.au	\$28.95* 200MB* 256Kbit/s	\$49* 1GB* 512Kbit/s	\$79* 16GB* 512Kbit/s	\$89* 8GB* 1.5Mbit/s
TelPacific	1300 369 888	www.telapacific.com.au	\$19.95* 100MB 256Kbit/s	\$49.95* 2GB 512Kbit/s	\$79.95 No limit 512Kbit/s	\$119.95 15GB* 1.5Mbit/s
TPG Internet	1300 360 855	www.tpg.com.au	\$19.95* 200MB 256Kbit/s	N/A	\$79.95 No limit 512Kbit/s	\$149.95 No limit 1.5Mbit/s
Verides Turbo Internet	1300 883 638	www.vti.com.au	\$19.95* 100MB 256Kbit/s	N/A	\$89.95 32GB 512Kbit/s	\$139.95 52GB 1.5Mbit/s
Veritel Australia	1300 669 869	www.veritel.com.au	\$27.95* 200MB 256Kbit/s	\$64.95* 1.5GB 512Kbit/s	\$89.95 No limit 512Kbit/s	N/A
Web Ace	1800 202 012	www.webace.com.au	\$28.95* 200MB 256Kbit/s	\$68.95 3GB* 512Kbit/s	\$82.95 No limit 512Kbit/s	\$159.95 25GB 1.5Mbit/s
West Australian Networks	1300 365 678	www.westnet.net.au	N/A	\$68.95 3GB* 512Kbit/s	\$79.95 No limit 512Kbit/s	\$119.95 8GB* 1.5Mbit/s
WestNet	1300 555 160	www.westnet.com.au	\$29.95* 200MB 256Kbit/s	\$59.95 4GB* 512Kbit/s	\$79.95 16GB* 512Kbit/s	\$89.95 5GB* 1.5Mbit/s

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✓	7	✗	\$148 12 mths	✗
✗	5	✓	\$125 6 mths	✓
✗	25	✓	\$149 6 mths	✓
✓	5	✗	\$159.95 6 mths	✓
✗	10	✗	\$129 6 mths	✓
✗	5	✓	\$150 6 mths	✓
✗	5	✓	\$99 6 mths	✓
✓	50	✓	\$109 6 mths	✓
✓	5	✓	\$150 6 mths	✓
✓	5	✗	\$143 1 mth	✓
✓	5	✗	\$129 6 mths	✓
✓	5	✓	\$99 6 mths	✓
✓	10	✗	\$148 6 mths	✓
✓	25	✓	\$59 6 mths	✓
✓	10	✓	\$99 6 mths	✓
✓	5	✗	\$149 6 mths	✗
✗	5	✓	\$110 6 mths	✓
✓	5	✓	\$89 6 mths	✓
✓	5	✓	\$139 6 mths	✓
✓	5	✓	\$140 3 mths	✓
✗	5	✓	\$99 6 mths	✓
✗	5	✓	\$129 6 mths	✗
✓	10	✓	\$129 6 mths	✓
✗	10	✗	\$129 6 mths	✓
✗	5	✓	\$259 12 mths	✗
✗	5	✓	\$149 12 mths	✗
✓	15	✗	\$99 6 mths	✗
✓	5	✓	\$99 6 mths	✓
✗	25	✓	\$139 6 mths	✓
✗	5	✓	\$99 6 mths	✓
✗	10	✗	\$99 6 mths	✓
✗	5	✓	\$149 3 mths	✓
✗	20	✓	\$129 12 mths	✓
✗	5	✓	\$99 6 mths	✓
✓	5	✓	\$125 12 mths	✓
✓	20	✓	\$125 6 mths	✓
✓	6	✓	\$110 6 mths	4
✗	6	\$0.83	\$99 1 mth	✓

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\*512 UltraLite comes with 6Gb included monthly data. 1Gb Peak. 1Gb Off Peak. 512 MaXimiser comes with 32Gb included monthly data. 1Gb Peak. 1Gb Off Peak. 512 PowerPlus comes with 50Gb included monthly data. 15Gb Peak. 25Gb Off Peak. Netspace Peak time is 7am to Midnight seven days a week. Off-Peak time is outside these hours. Netspace ADSL Broadband is available Australia wide, where ADSL enabled standard telephone lines apply.



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**PC USER**



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- Silent Operation
- Support 90Mins Media
- Horizontal or Vertical Mounting
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- Software Incl: Ahead Nero Express 6
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#### TEAC EXT DVD WRITER DV-W22E PUB



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## Featured Products



**DCS-5300W Wireless Internet/Security Camera**  
Remotely watch and listen with the D-Link SecurCam DCS-5300W Internet Camera. The DCS-5300W is a powerful surveillance system that connects to a wired Ethernet or Enhanced 802.11b wireless connection to provide remote high-quality video and audio. The DCS-5300W provides advanced technology with DDNS and UPnP support.

Easily access your camera using an Internet Explorer browser from anywhere in the world. From the web browser you can view video from the DCS-5300W and manage the camera. The DCS-5300W comes with CCD sensor that provides a sharp and clear image with life-like color representation.



#### DI-624 108Mbps Wireless IP Router for DSL/Cable Modem

DI-624 can achieve wireless speeds up to 15x in a pure D-Link 108G environment through the use of new wireless techniques such as Packet Bursting, FastFrame, Compression & Encryption, and Turbo mode. This provides a bandwidth large enough to handle video/audio streaming and Video on Demand (VoD) applications.

The DI-624 features the very latest in advanced wireless silicon chip technology including enhanced security to shield and protect your wireless communication from intruders. It also includes D-Link's own robust firewall security features. The DI-624 is ideal for those creating their first wireless network, as well as for more advanced users looking for additional management settings and policy-based content filtering.



#### DSM-320 802.11g Wireless Media Player

The DSM-320 unifies your network with your home entertainment center, allowing you to share, access, and enjoy your digital media-whether it is music, videos, or photos-in the comfort of your living room.

The DSM-320 supports 802.11g wireless standards with transfer speeds up to 54Mbps, giving you maximum throughput for your digital media. Setting up the DSM-320 Wireless Media Player is simple, and the sleek design makes it a natural addition to your home entertainment center. Audio Video (AV) jacks on the back panel of the DSM-320 can be plugged directly into your TV, letting you access digital media content stored on your PC, browse your music files, watch your videos, and display your photos.



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		Pentium II / III	
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Celeron 766	\$170	ASUS CUV-4X-E	\$245
Celeron 800	\$180	ASUS CUSL2	\$240
Celeron 850	\$200	ASUS CUSL2-C	\$240
Pentium III 866B	\$375	ASUS CUSI-M	\$165
Pentium III 933B	\$417		
Pentium III 1GHz	\$445		
P4-1.3Gb	\$595		
P4-1.4Gb	\$644		
P4-1.5Gb	\$794		
AMD		GA-6VXC7-4X-P	\$165
Athlon 900 & fan	\$255	GA-60XE-1	\$215
Athlon 1G & fan	\$315	GA-60XE	\$235
Athlon 1.2G & fan	\$350	GA-60X	\$195
Athlon 1.3G & fan	\$400	MSI-694D Master	\$290
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Duron 850 & fan	\$180	Aopen AX34pro	\$220
Duron 900 & fan	\$200		
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		AMD Athlon	
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Hercules 3D Prophet II 64Mb Ultra	\$875
Hercules 3D Prophet GeForce II 64Mb	\$999
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Celeron 850	\$1380
Pentium III 866	\$1550
Pentium III 933	\$1600
Pentium III 1G	\$1620

AMD Astra pro	
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• 20GB 7200rpm HDD	
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• S/B 128 3D Sound card	
• 5x CD Rom	
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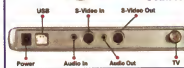


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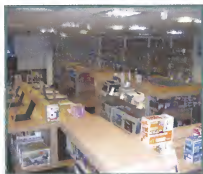
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## NSW &amp; VIC Showrooms

You will find the showrooms stocked with a large range of hardware, software and consumable products. If you wish, you can also organise to pickup your orders from these locations.

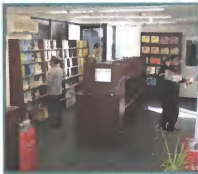


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 Business Development Manager  
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**Farnel Kiegaldie**  
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**Tony Chan**  
 Sales Support  
 Tel: 02 9455 5910 Email: [tony.chan@cs.com.au](mailto:tony.chan@cs.com.au)



## City Software is an Australian Government Endorsed Supplier.

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With a RentSmart rental finance facility, you simply select the equipment you need from ISWH and/or City Software. RentSmart will buy the equipment and rent it back to you.

You'll benefit from tax deductible monthly payments which are good for your cashflow. And because you've rented rather than purchased outright, you'll always be free to update to new equipment when you need (Conditions apply).

Finance is available for hardware items over \$500 or where hardware represents 60% of the purchase value. Figures based on 36 month continuous term and include GST and stamp duty. RentSmart is available to approved customers on selected products. Terms and conditions subject to change without notice.



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- Special product promotions offered only to members.
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## MGE Pulsar Ellipse 1200V

Pulsar Ellipse 1200VA  
Power protection for your personal and professional computers. MGE's all new Pulsar ellipse is the UPS of choice to maximize the availability of PCs and workstations in small and home office environment.

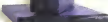


**\$330**

Websearch Code ..... 246840

## MGE Pulsar Evolution 2200VA

MGE UPS SYSTEMS meets your need with Pulsar Evolution, a reliable, ultra-compact power protection solutions. Designed for networking equipment, rack-optimised servers, traditional rack and tower servers and network storage systems.



**\$1650**

RENTMART **\$18.09**  
PER WEEK  
Websearch Code ..... 246841

## MGE Pulsar Extreme C 1500VA

Online double conversion technology, tower or rack-optimized format. High-end power protection ideal for: Servers, whether rack-mounted or standing, Networking & VOIP, Storage, Telecom equipment, Medical equipment. Sensitive electronic equipment in industrial environment.



**\$1870**

RENTMART **\$20.50**  
PER WEEK  
Websearch Code ..... 246842

## Exabyte VXA-2 Packet Tape Drive

VXA-2 is the second-generation drive based on the award winning VXA packet technology and is quickly becoming the standard for DD5 replacement. VXA-2 delivers 4x more capacity and 2x more speed than equivalent DD5 technology at a similar price. It's the only tape drive that allows users to migrate to a higher capacity, higher performance tape backup product at the same cost to which they are accustomed.

- 160 GB capacity
- 12 MB/sec transfer rate
- 4x more capacity than DD5-4
- VXA2 External Firewire Kit (223884) **\$2549**



RENTMART **\$21.70**  
PER WEEK  
Websearch Code ..... 223883 **\$1980**

## Exabyte VXA-2 PacketLoader 1x10 1U

The most affordable, compact automated data storage solution for users with space and budget constraints.

- 10 Cartridge Capacity
- Up to 1.6TB (assumes 2:1 compression)
- Up to 2 Weeks of Unattended Backup
- 1u Form Factor
- Standard Barcode Reader
- Optional Remote Management Capability
- VXA2 PacketLoader Rackmount Kit (223886) **\$303**



VXA-2 PacketLoader 1x10 1U  
RENTMART **\$35.04**  
PER WEEK  
Websearch Code ..... 223885 **\$3573**

## Exabyte 110L LTO Ultrium

Ideal for distributed networks and remote installations, the 110L is a compact alternative to stand-alone tape drives, eliminating the need to manually load tapes.

- Support for Ultrium LTO-1 and Ultrium LTO-2 tape drives
- 10 cartridge slots
- Up to 4 TB capacity (assumes 2:1 compression)
- Up to 252 GB/hr performance\*
- 110L with 1xLTO2 (223888) **\$13130**



110L LTO Ultrium  
RENTMART **\$93.15**  
PER WEEK  
Websearch Code ..... 223887 **\$10909**

## Tandberg SDLT320

The SDLT 320 represents a major advance in capacity and performance over todays biggest selling midrange tape drive, the DLT 8000.

- 320GB of compressed storage
- Up to 32MB/sec sustained data transfer rate
- 30,000 hour recording head life
- 1,000,000 pass media durability
- 250,000 hours MTBF at 100% duty cycle
- Full backward read compatibility with DLTtape IV cartridge media written on DLT 4000, DLT 7000, DLT 8000 and DLT 1V/SD0 drives.
- Full backward read and write compatibility with SDLT1 media written on SDLT220 drives.
- 3 Years Advanced Replacement Warranty
- External (223902) **\$4917**



Internal  
RENTMART **\$37.52**  
PER WEEK  
Websearch Code ..... 223901 **\$4015**

## Tandberg SDLT600

The Tandberg SDLT600 is the latest member of the Tandberg DLT family will be twice as fast and have almost twice the capacity of the SDLT320.

- 600GB of compressed storage
- Up to 72MB/sec sustained data transfer rate
- 30,000 hour recording head life
- 1,000,000 pass media durability
- 250,000 hours MTBF at 100% duty cycle
- Full backward read compatibility with SDLT 1 media written on SDLT220 and SDLT320 drives and DLTtape V51
- 3 Years Advanced Replacement Warranty
- External (223904) **\$5184**



Internal  
RENTMART **\$66.72**  
PER WEEK  
Websearch Code ..... 223903 **\$7689**

## Tandberg DLTVS160

The DLT V5 (ValueSmart) 160 features twice the capacity of the popular, industry-first, half-high DLT VS80 tape drive.

- 160GB of compressed storage
- Outstanding performance - up to 16MB\* per second transfer rate
- Uses ValueSmart Media - offering unprecedented value in terms of cost per GB of tape storage.
- 3 Years Advanced Replacement Warranty Supported by all major software suppliers.
- External (223908) **\$2497**



Internal  
RENTMART **\$22.76**  
PER WEEK  
Websearch Code ..... 223907 **\$2321**

## Tandberg DLT VS80

The Tandberg DLT VS80 is now available to provide you with the very same mission-critical reliability, capacity, performance, and value found in the successful DLT1, but in a half-height form factor.

- 80GB of compressed storage
- Up to 6MB/sec sustained data transfer rate
- Half-height form factor
- 3-year warranty
- Read backward compatible with the DLT4000 & DLT1 format
- Supported by all major software suppliers
- 3 Years Advanced Replacement Warranty
- External (223906) **\$1749**



Internal  
RENTMART **\$16.88**  
PER WEEK  
Websearch Code ..... 223905 **\$1540**

## Tandberg SuperLoader

The SuperLoader provides automated scalable tape automation in a rack-mountable 2U form factor as well as the high capacity, performance and reliability of DLTapeTM and LTO2 technology.

- Up to 6.4Tb in a 2U (3.5-inch high) rack-mountable form factor
- Choose performance or value with either SDLT 320, SDLT 620, DLT1 or LTO2 tape drives
- Modular architecture for fast and easy configuration, service, and upgrades
- Web-based integrated management tools
- Mail slot for "on-the-fly" cartridge import and export
- 3 Years Advanced Replacement Warranty
- SDLT16 Slot (223910) **\$13019**



LTO-2/16 Slot  
RENTMART **\$122.76**  
PER WEEK  
Websearch Code ..... 223909 **\$14985**

## Tandberg M1500

Modular, Stackable Data Protection - The M1500 is an automated tape library that allows cross-product interoperability and true modular scalability.

- Scalable from one to 20 drives for a performance up to 4.3 TByte/hr
- Expands from 20 to 300 cartridges for native capacity up to 60 TByte
- Supports Tandberg SDLT600, SDLT320, LTO Ultrium or LTO Ultrium2 tape drives
- Hot-swappable tape drives and hot-swappable redundant power supplies
- 3 Years On-Site Next Business Day (NBD) Warranty
- SDLT20 Slot (223911) **\$14960**



LTO-2/24 Slot  
Websearch Code ..... 223912 **\$17206**

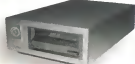
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**Voucher**



## Certance DAT 72 External Tape Drive

Certance's DAT 72 drive family provides data protection and outstanding reliability for server and workstation environments with an MTBF rating of 483,000 hours at 12% duty cycle.

- Up to 72 GB of data protection per DAT 72 data cartridge
- Compressed data transfer rate up to 25.2 GB/hour
- Compatible with MS Windows 2000, 2003, Novell NetWare 5 & 6, and Linux.
- Yosemite Technologies TapeWare XE backup software for Windows 98/Me/XP/NT/2000/2003, NetWare 5 & 6, and Linux included



**RENTAL PRICE \$19.90 PER WEEK \$1815**  
Websearch Code 223893

## Certance LTO 2 Drive

Certance CL400 LTO Ultrium 2 tape drives balance price with capacity/performance targeted at medium-to-large businesses.

- Most reliable LTO Ultrium 2 tape drive available
- Capacity up to 400 Gbytes per cartridge
- Enterprise class performance up to 245 GB/hr
- The most reliable Ultrium 2 tape drive available from any manufacturer
- Backward-compatible with LTO-1 tape drives from all manufacturers
- Complete solution includes BakBone NetVault WorkGroup backup software



**RENTAL PRICE \$59.15 PER WEEK \$6489**  
Websearch Code 223900

## Certance LTO-2 Autoloader

The Certance ALB10 autoloader delivers up to 1.6 TB of compressed data protection at transfer rates up to 115.2 GB per hour.

- External Ultra2 SCSI / LVD autoloader holds 8 cartridges in a 2U form factor.
- Up to 1.6 TB of data protection using 8 cartridges
- Compressed data transfer rate up to 1.92 GB / minute
- Supports Read While Write (RWVW) and Hardware Data Compression
- FastSense variable speed technology optimizes backup time
- Autoloader support available for Windows Server, NetWare, Linux and UNIX
- Dynamic Powerdown protects cartridge and drive during a power loss
- Optional rack-mount kit and barcode reader



**RENTAL PRICE \$91.26 PER WEEK \$10688**  
Websearch Code 223891

## Certance Travan 40 USB

Certance TapeStor Travan USB 2.0 20/40 Gbyte tape backup solution provides complete external data protection for notebook and desktop PCs, workstations, and Apple systems with USB connectivity. Based on Certance's award-winning TapeStor Travan products, this solution includes a 40 Gbyte tape drive, Dantz Retrospect Express for Windows and Mac OS X operating systems, USB cable, one data cartridge and on-line User's Guide. A stand for using the drive in a vertical orientation minimizes required tabletop space.



**RENTAL PRICE \$675 PER WEEK \$7,40**  
Websearch Code 246637

## Sony SAIT Drive

SAIT is a new tape-based data storage technology platform, that has been developed to address the ever-increasing storage needs of data intensive network environments.

- 500GB (native), 1.3TB (compressed)\*
- Sustained transfer rate: 30 MB/s (native), 78 MB/s (compressed)\*
- SCSI Ultra 160
- MTBF\*\* 500,000 POH (duty 100%)
- 5.25-inch full height drive mounted in external enclosure
- Assumes 2.6:1 compression with ALDC.



**RENTAL PRICE \$17028**  
Websearch Code 223892

## Sony AIT-3 Drive

Suitable for a PC or Mac power workstation / medium-large server. Comes complete with everything required for installation & operation assuming the machine has a SCSI interface

- Native Capacity: 100GB (230m AIT-3 tape)
- Native Storage Speed: 12MB/s
- Interface Speed: 160MB/s synchronous
- Buffer: 18MB
- Average Access: <27s (MIC equipped tape)
- Media Supported: 8mm 170m & 230m (no MIC, standard or Remote MIC)



**RENTAL PRICE \$41.50 PER WEEK \$4440**  
Websearch Code 203817

## Sony AIT-3 Autoloader

Now you can fit up to one week's backup in a compact, easy-to-use desktop device! The StorStation LIB081 is slightly larger than a standalone tape drive, thereby enabling simple placement on a desktop or even on top of a server. Native Capacity: 0.8TB

- Compressed Capacity: 2.08TB
- Sustained Transfer Rate Native: 12MB/s
- Max Backup Rate: 43.2 (max) GB/hr
- Max Number of Cartridges: 8
- Media Supported: AIT-1 35 GB; AIT-2 50 GB, AIT-3 100GB



**RENTAL PRICE \$96.42 PER WEEK \$11770**  
Websearch Code 223893

## Snap Appliance 1100

A portable footprint, low cost and quiet design make this an ideal server for remote offices, trade shows, sales calls or presentations.

- The SnapOS Operating System
- 80GB, 160GB
- Five minute installation.
- Compact, portable easily fits in a briefcase, on a shelf or on a tabletop.
- Supports Windows, NetWare, Macintosh, Unix and Linux platforms.
- 100Base-TX/10Base-T Ethernet connectivity
- 160GB (223895) **\$1672**



**RENTAL PRICE \$12.66 PER WEEK \$1155**  
Websearch Code 223894

## Snap Appliance 2200

Add a whisper-silent file server with RAID for a fraction of the cost of a traditional file server.

- 240GB
- Simple, award-winning user interface for ease of management
- RAID 1 (mirroring), 0 (striping) or JBOD (Just a Bunch Of Disks)
- 100Base-TX/10Base-T Ethernet connectivity
- SNMP support for centralised management (can be managed remotely via Web browser)
- Kensington Security Slot for physical security



**RENTAL PRICE \$28.37 PER WEEK \$2893**  
Websearch Code 223896

## Snap Appliance 4500

Industry-leading performance and capacity for departmental storage for your enterprise. No other 1U storage server matches its performance, capacity and feature set.

- Rack-optimized 1U server
- 480GB, 640GB, 720GB, 1TB
- Ideal for: File sharing, near-line storage, on-line backup, remote office server.
- Every Snap Server 4500 can support up to two Snap Disk 10 expansion arrays for easy to manage, best-in-class storage expansion.
- 640GB (223898) **\$8250**
- 720GB (223899) **\$9130**
- 1TB (223900) **\$10560**



**RENTAL PRICE \$65.09 PER WEEK \$7502**  
Websearch Code 223897

## Symantec V2i Protector Server Edition

Rebuild a Windows Server in Under 10 minutes! V2i Protector is a real-time, disk-based system, and storage backup solution designed to capture and encapsulate all server or desktop files and configurations in one easy-to-manage backup file. Backups can be saved to a SAN, NAS, RAID, or CD/DVD without interrupting user productivity or application usage. Government and Academic pricing also available.



**RENTAL PRICE \$1760 PER WEEK \$1760**  
Websearch Code 246639



### Kensington Security Notebook Microsaver Slim

- Your first line defence against slim notebook computer theft.
- Nearly all notebook computers sold today include the Kensington security slot.
- Strongest lock and cable on the market.
- Patented T-bar design engages the maximum surface area possible in the Kensington security slot.
- Slimmer lock and sleek cable designed especially for slim notebook computers.
- Cable Length - 180cm



**Strongest lock & cable on the market**

**\$79**

Websearch Code ..... 19354

### Kensington Security Twin Microsaver

Kensington Twin MicroSaver is designed for use with Kensington security slot. It offers the strongest protection with its two patented T-bar locks. It is long enough to comfortably secure two pieces of computer equipment. It also withstands more force with more surface area against interior wall of security slot.

- Uses standard Kensington slot on 2 pieces of equipment.
- Extra long cable (2.2m) to secure 2 pieces of equipment.



**\$110**

Websearch Code ..... 22155

### IBM Computer Systems



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### IBM Laptops



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Series:	A30	A30	A50P
Model:	B191LMP	B191LMQ	B1954AM
Form Factor:	Desktop	Desktop	Mini Tower
Processor:	Celeron 2.4Ghz	Pentium P4 2.8Ghz	Pentium P4 3.0Ghz
Memory (RAM):	256MB	256MB	512MB
Video:	Intel Extreme Graphics	Intel Extreme Graphics	Intel Extreme Graphics
Hard Drive:	40GB 7200RPM	40GB 7200RPM	80GB 7200RPM
Storage:	CD-Rom, Floppy	CD-Rom, Floppy	Multi-Burner
Modem/Ethernet:	Integrated Intel PRO/100 Eth.	Integrated Intel PRO/100 Eth.	Integrated Intel PRO/100 Eth.
Keyboard:	IBM Preferred Pro	IBM Preferred Pro	IBM Preferred Pro
Mouse:	IBM Wheel Mouse	IBM Wheel Mouse	IBM Wheel Mouse
Operating System:	MS Windows XP Pro	MS Windows XP Pro	MS Windows XP Home
Warranty:	1 year	1 year	1 year

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Per Week \$11.03 PER WEEK  
Websearch Code ..... 21448

**\$1065**

Per Week \$11.67 PER WEEK  
Websearch Code ..... 21449

**\$1579**

Per Week \$17.31 PER WEEK  
Websearch Code ..... 21454

Series:	R40e	G40	R51
Processor:	Celeron 2.2Ghz	Pentium P4 3Ghz	Pentium M 1.6Ghz
Memory (RAM):	256MB	256MB	256MB
Video (RAM):	ATI RADEON IGP 330M	Intel Extreme Graphics	ATI Mobility RADEON 7500
Hard Drive:	30GB 4200RPM	40GB 4200RPM	40GB 4200RPM
Storage:	Combo Drive	Combo Drive	Combo Drive
Display:	14.1" XGA	15" XGA	15" XGA
Modem/Lan:	56k (V.92) / 10/100	56k (V.92) / 10/100	56k (V.92) / 10/100
Pointing Device:	TrackPoint	TrackPoint	ThinkPad UltraNav
Operating System:	MS Windows XP Pro	MS Windows XP Pro	MS Windows XP Pro
Weight:	2.7kg	4.02kg	3.0kg
Dimensions:	3.89cm x 31.3cm x 25.4cm	5.09cm x 32.9cm x 28.2cm	4cm x 33.2cm x 26.9cm
Warranty:	1 year	1 year	1 year

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Per Week \$17.94 PER WEEK  
Websearch Code ..... 22436

**\$2342**

Per Week \$22.97 PER WEEK  
Websearch Code ..... 21158

**\$2597**

Per Week \$25.47 PER WEEK  
Websearch Code ..... 22439

Series:	T41	T41	R51
Processor:	Pentium M 1.6Ghz	Pentium M 1.6Ghz	Pentium M 1.7Ghz
Memory (RAM):	256MB	512MB	512MB
Video (RAM):	32MB ATI Mobility RADEON	Mobility RADEON 7500	ATI Mobility RADEON 9000
Hard Drive:	30GB 4200RPM	40GB 4200RPM	60GB 4200RPM
Storage:	Combo Drive	Combo Drive	Combo Drive
Display:	14" XGA	14.1" XGA	15" XGA
Modem/Lan:	56k (V.92) / 10/100	56k (V.92) / 10/100	56k (V.92) / 10/100
Pointing Device:	ThinkPad UltraNav	ThinkPad UltraNav	ThinkPad UltraNav
Operating System:	MS Windows XP Pro	MS Windows XP Pro	MS Windows XP Pro
Weight:	2.2kg	2.2kg	3.2kg
Dimensions:	3.89cm x 31.3cm x 25.4cm	3.89cm x 31.3cm x 25.4cm	3.89cm x 33.2cm x 26.9cm
Warranty:	1 year	1 year	1 year

**PRICE MAY DROP!**

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Per Week \$25.29 PER WEEK  
Websearch Code ..... 21109

**\$3468**

Per Week \$34.01 PER WEEK  
Websearch Code ..... 21110

**\$3468**

Per Week \$34.01 PER WEEK  
Websearch Code ..... 22438

## Mitac Computer Systems

If you are after a SOHO, Performance or Power PC, Mitac has the solution. Choose from these standard models, or call us now and we will custom build your PC quickly and simply. Mitac is a US\$5 billion group of companies providing well engineered products ensuring the highest quality and reliability at competitive prices. Receive a 2 year return-to-base warranty and free person-to-person telephone technical support. The ultimate performance PCs without the price tag!

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we'll help custom  
build your PC!



Monitor not  
included.

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It's Cheaper!**

Buy Office XP Pro with a new PC and SAVE approximately 55% off the RRP of full commercial versions! Call 1300 300 003 for more details on purchasing Office 2003 Edition with your new PC. (OEM versions)



Processor:	Intel Celeron 2.8GHz	Intel Pentium 4 3.0GHz HT	Intel Pentium 4 3GHz HT	Intel Pentium 4 3.0GHz HT	Intel Pentium 4 3.2GHz HT
Motherboard:	Gigabyte GA-865GM-R2	Gigabyte GA-865000MK	Gigabyte GA-8875	Gigabyte GA-8875	Gigabyte GA-8875
Memory (RAM):	512MB 333MHz	512MB 400MHz	512MB 400MHz	1GB 400MHz	1GB 400MHz
Hard Drive:	80GB 7200rpm ATA 100	80GB 7200rpm ATA 100	120GB 7200rpm ATA 100	120GB 7200rpm ATA 100	120GB Serial ATA
Storage:	52x32x52 CD-RW, Floppy	52x32x52 CD-RW, Floppy	Combo, Floppy	DVD Burner, Floppy	DVD Burner, Floppy
Graphics:	Integrated VGA	Intel Video Extreme	Gigabyte Radeon 5200 128Mb	Gigabyte Radeon 5200 128Mb	Gigabyte Radeon 9800 Pro 128Mb
Modem:	56K	56K	56K	56K	56K
Network:	Integ. 10/100 NIC	Intel Pro100VE NIC	Integ. 10/100 NIC	Intel Pro100VE NIC	Intel Pro100VE NIC
Keyboard:	Microsoft Multimedia	Microsoft Multimedia	Microsoft Multimedia	Microsoft Multimedia	Microsoft Multimedia
Mouse:	Microsoft Wheel Optical	Microsoft Wheel Optical	Microsoft Wheel Optical	Microsoft Wheel Optical	Microsoft Optical
Operating System:	MS Windows XP Home	MS Windows XP Home	MS Windows XP Home	MS Windows XP Home	MS Windows XP Pro
Warranty:	2 Yrs Return-to-Base	2 Yrs Return-to-Base	2 Yrs Return-to-Base	2 Yrs Return-to-Base	2 Yrs Return-to-Base

**PRICE MAY  
DROP!**

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for best price

<b>\$1059</b> Websearch Code... 223824	<b>\$1255</b> Websearch Code... 223825	<b>\$1496</b> Websearch Code... 223826	<b>\$1759</b> Websearch Code... 223827	<b>\$2248</b> Websearch Code... 223828
<b>\$11.61 PER WEEK*</b>	<b>\$13.76 PER WEEK*</b>	<b>\$16.40 PER WEEK*</b>	<b>\$19.28 PER WEEK*</b>	<b>\$22.05 PER WEEK*</b>



## Toshiba Notebooks

- Satellite Series**  
Ideal for small business, home office & personal users.
- Tecra series**  
High quality technology platform with wireless connectivity.
- Portege series**  
Ultra portable wireless computing without compromise.

Satellite P20 model displayed with 17" TFT Wide XGA.

**Purchase Office  
2003 on your new  
computer -  
It's cheaper!**

Series:	Satellite A10	Satellite A10	Tecra M2	Satellite P20
Model:	PSA10A-3V1KK	PSA10A-05UHM	PTM20A-002T1	PSP20A-4E8HV
Processor:	Celeron 2.5GHz	Pentium P4-M 2.4GHz	Pentium P4-M 1.5GHz	Pentium P4 3.06GHz
Memory (RAM):	256MB	512MB	512MB	512MB
Video (RAM):	64MB	64MB	64MB	64MB
Hard Drive:	40GB	60GB	40GB	80GB
Storage:	Combo	DVD Burner	Combo	DVD Burner
Display:	14.1" LCD 1024x768	15" LCD 1024x768	14.1" TFT 1024x768	17" XGA TFT 1440 x 900
Modem/LAN:	Modem/ 10/100 Ethernet	Modem/ 10/100 Ethernet	Modem/ 10/100 Ethernet	Modem/ 10/100 Ethernet
Operating System:	MS Windows XP Pro	MS Windows XP Pro	MS Windows XP Pro	MS Windows XP Pro
Weight:	2.8kg	2.8kg	2.26kg	4.5kg
Dimensions (WxDxH):	332x293x33-40	332x293x33-40	314x259x32-35	419x293x41-47
Warranty:	1 Year parts & labour	1 Year parts & labour	1 Year parts & labour	1 Year parts & labour

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<b>\$1639</b> Websearch Code... 224333	<b>\$2715</b> Websearch Code... 211567	<b>\$2715</b> Websearch Code... 225006	<b>\$4259</b> Websearch Code... 246440
<b>\$17.97 PER WEEK*</b>	<b>\$26.63 PER WEEK*</b>	<b>\$26.63 PER WEEK*</b>	<b>\$39.81 PER WEEK*</b>

**\$55**  
Websearch Code... 193213

## Kensington Security Desktop Microsaver

Desktop MicroSaver's universal design safeguards all types of computers and peripherals, quickly and easily. Desktop MicroSaver secures up to three pieces of office equipment. Specially designed security plates bond securely to equipment or desktop surfaces, and a steel cable links individual items together, or anchors everything to one location. Includes lock and 1800mm cable, 2 keys, 3 secure plates, tube of instant bond glue.



**\$74**  
Websearch Code... 223154

## HP iPAQ 1910 PDA Accessories Kit

- Sync and Charge your PDA with a single cable and also in the car with the included Cigarette Lighter Adaptor.
- Protect your screen from scratches and wear
- Replace lost stylus
- Protect your PDA with a leather carry case

**\$75**

Websearch Code.....22280

## Belkin Universal Slim Leather Case

For Handhelds  
Your Palm, Handspring or other handheld will attach securely in place with a simple Velcro system. Fine grain leather case includes compartments for essentials like business and credit cards, ID and even a spare stylus.

**\$45**

Websearch Code.....20844

## Belkin USB PDA Adaptor

Provides one DB9 Serial Port and is the most convenient way to connect your handheld to your computer. Works with Palm and other popular handheld PDAs. Completely portable. Lifetime Warranty.

**\$59**

Websearch Code.....189545



We stock a huge range of genuine and third party accessories!

## Palm Handhelds

With a reputation for being easy to learn & use, Palm handhelds are the most popular in the world.

**Also available** - Customise your handheld and add new functionality with accessories for your model.

**Expansion Cards** - Add software, eBooks and even databases with memory-saving MultiMediaCard or SD expansion cards.

**Peripherals** - Snap-on a keyboard, wireless modem or even a GPS receiver for "I-didn't-know-I-could-do-that" transformations.

**Cases & Covers** - Express yourself with black leather, tough aluminium, or whatever suits you.



### Palm Zire 71

Memory: 16MB  
Screen: 320x320 Transflective Colour  
Processor: TI (ARM) OMAP 310 144MHz  
OS Version: Palm OS 5.2.1  
Size: 116x74x17mm  
Weight: 150g

Features: Personal Organiser, Word/Excel/PowerPoint  
Compatibility: MP3 & Video  
Playback, Stereo Headphone Jack, Built-in Digital Camera

• (224323) \$343



### Palm Tungsten W

Memory: 16MB  
Screen: 320x320 Transflective Colour  
Processor: Motorola Dragonball 334MHz  
OS Version: Palm OS 4.1.1  
Size: 122x78x15.5mm  
Weight: 185g

Features: Personal Organiser, Word/Excel/PowerPoint  
Compatibility, Stereo Headphone Jack, Voice Communications, QWERTY Keyboard, GSM/GPRS

• Rentsmart \$6.79pw

(223637) \$619



### hp iPAQ H1930

Memory: 64MB  
Screen: 240x320 Transflective Colour  
Processor: Samsung (2410) 203MHz  
OS Version: MS Win Pocket PC 2003 Pro  
Size: 113x70x13mm  
Weight: 124g

Features: Voice Recorder, SD Slot (SD/SD/MMC), Speaker, Microphone, Stereo Jack, Audio Record/Playback

• (209078) \$375



### hp iPAQ H2210

Memory: 64MB  
Screen: 240x320 Transflective Colour  
Processor: 400MHz Intel XScale tech-based  
OS Version: MS Win Pocket PC 2003 Prem  
Size: 115x150x5mm  
Weight: 144g

Features: Handwriting Recognition, Soft Keyboard, Character Recognition, Voice Recorder, Inking, SD/CF Slots, Audio Record/Playback, Speaker, Handphone Microphone Jack, Bluetooth

• Rentsmart \$6.22pw

(207311) \$567



### hp iPAQ H4350

Memory: 64MB  
Screen: 240x320 Transflective Colour  
Processor: Intel 400 MHz processor with XScale technology  
OS Version: MS Win Mobile 2003  
Size: 138.7x74x14.5mm  
Weight: 165g

Features: 400MHz Intel XScale processor, 3.5" VIS, 32MB Flash ROM Memory, WLAN 802.11b Bluetooth, MS Windows Mobile 2003, Microphone, Speaker, Headphone Jack, MP3 Stereo, Integrated Keyboard

• Rentsmart \$8.34pw

(212949) \$761



### Palm Zire 21

Memory: 8MB  
Screen: 160x160 Monochrome  
Processor: TI (ARM) OMAP 311 128MHz  
OS Version: Palm OS 5.2.1  
Size: 112x74x16mm  
Weight: 108g

Features: Personal Organiser, HotSync cable, Charging cable, Rechargeable lithium ion battery

• (210736) \$165



### Palm Tungsten E

Memory: 32MB  
Screen: 320x320 Transflective Colour  
Processor: TI (ARM) OMAP 311 128MHz  
OS Version: Palm OS 5.2.1  
Size: 115x78x12mm  
Weight: 131g

Features: Personal Organiser, Word/Excel/PowerPoint  
Compatibility, MP3 & Video Playback, Stereo Headphone Jack

• (210737) \$329



### Palm Tungsten T3

Memory: 64MB  
Screen: 320x480 Transflective Colour  
Processor: Intel XScale 400MHz  
OS Version: Palm OS 5.2.1  
Size: 109x78x13mm  
Weight: 156g

Features: Personal Organiser, Word/Excel/PowerPoint  
Compatibility, MP3 & Video Playback, Stereo Headphone Jack, Voice Memo Recorder, Portrait/Landscape Screen Display, Bluetooth

• Rentsmart \$6.70pw

(210738) \$611



### Palm Tungsten C

Memory: 64MB  
Screen: 320x320 Transflective Colour  
Processor: Intel PXA255 400MHz  
OS Version: Palm OS 5.2.1  
Size: 122x78x17mm  
Weight: 178g

Features: Personal Organiser, Word/Excel/PowerPoint  
Compatibility, MP3 & Video Playback, Stereo Headphone Jack, Voice Memo Recorder, QWERTY Keyboard, Wi-Fi

• Rentsmart \$6.62pw

(195168) \$604



### hp iPAQ H1940

Memory: 64MB  
Screen: 240x320 Transflective Colour  
Processor: Samsung (2410) 266MHz  
OS Version: MS Win Pocket PC 2003 Pro  
Size: 113x70x13mm  
Weight: 124g

Features: Voice Recorder, SD Slot (SD/SD/MMC), Speaker, Microphone, Stereo Jack, Audio Record/Playback, Bluetooth

• (207330) \$471



### hp iPAQ H4150

Memory: 64MB  
Screen: 240x320 Transflective Colour  
Processor: 400MHz Intel XScale tech-based  
OS Version: MS Win Mobile 2003  
Size: 114x147x11mm  
Weight: 132g

Features: Handwriting Recognition, Soft Keyboard, Character Recognition, Voice Recorder, Inking, SD/SD/MMC Slot, Speaker, Microphone, Headphone Jack, MP3 Stereo, 32MB Flash ROM, Bluetooth

• Rentsmart \$7.54pw

(211181) \$688



### hp iPAQ H5550

Memory: 128MB  
Screen: 240x320 Transflective Colour  
Processor: 400MHz Intel XScale tech-based  
OS Version: MS Win Pocket PC 2003 Prem  
Size: 138x84x16mm  
Weight: 207g

Features: Handwriting Recognition, Soft Keyboard, Character Recognition, Voice Recorder, Inking, SD/MMC Slot, Speaker, Microphone, Stereo Headphone Jack, Audio Record/Playback, 48MB Flash ROM, Bluetooth

• Rentsmart \$12.27pw

(207332) \$1119

## Toshiba e400 Pocket PC

Pocket PC 2003 operating system, Intel XScale PXA-251 at 300MHz processor, colour screen, 128MB RAM system memory plus 32MB (NAND) ROM memory plus 16MB operating system memory, Secure Digital (SD) slot, Infrared Port, built-in speaker and microphone, MP3 and Windows Media. Dimensions: 77x125x10.15mm. Additional software applications: Text-to-Speech, World Clock, Voice Command, Clear View, Voice Recorder, Auto Backup.



RENT SMART! \$6.11 PER WEEK

Websearch Code.....212626

**\$557**

## Toshiba e800 Pocket PC

Pocket PC 2003 operating system, Intel XScale PXA-263 at 400MHz processor, colour display, (480x640 resolution), 128MB RAM system memory plus 32MB (NAND) ROM memory plus 32MB operating system memory, voice record button, integrated Bluetooth or integrated Wi-Fi IEEE 802.11b, SD/CF card slot, infrared port. Dimensions: 77x135x15.7mm. Bluetooth.



• Wi-Fi (212528) \$1172

RENT SMART! \$12.27 PER WEEK

Websearch Code.....213011

**\$1119**

## o2 XDA II Pocket PC & CSM Phone

Features: 400MHz Intel XScale PXA263 processor, 128MB SDRAM, 64MB ROM, 3.5" transfective 65,536 colour LCD (240 x 320 pixels), MMC & SDIO slot, Infrared Port, Bluetooth, iMMS/MMMS, full internet browsing, VGA camera (640 x 480 pixels), MPEG camcorder, MP3 media player, speakerphone and voice recorder facility, handwriting recognition, Windows Mobile 2003 for Pocket PC. Size: 70x130x15mm, 190 grams.



RENT SMART! \$13.86 PER WEEK

Websearch Code.....223575

**\$1264**


**iswh**

 Hardware  
Software  
Consumables

**Monitors**
**Philips CRT Monitors**


<b>Websearch</b> 222758 203507	<b>17" Product Description</b> 107E Beige (Available in Black) 1077 Flat Beige (Available in Black)	<b>Dot Pitch</b> 0.27mm 0.25mm	<b>Max. Res</b> 1280x1024 1280x1024	<b>Hor.Scan.Freq</b> 85 85	<b>Refresh</b> 70KHz 71KHz	<b>Price</b> \$164 \$176
<b>Websearch</b> 212643 130602	<b>19" Product Description</b> 1098 Flat Beige (Available in Black) 109P Flat Beige	<b>Dot Pitch</b> 0.25mm 0.25mm	<b>Max. Res</b> 1920x1440 1920x1440	<b>Hor.Scan.Freq</b> 85 85	<b>Refresh</b> 97KHz 111KHz	<b>Price</b> \$372 \$609
<b>Websearch</b> 195386	<b>21" Product Description</b> 201B Beige	<b>Dot Pitch</b> 0.25mm	<b>Max. Res</b> 1920x1440	<b>Hor.Scan.Freq</b> 85	<b>Refresh</b> 115KHz	<b>Price</b> \$737
<b>Websearch</b> 195387	<b>22" Product Description</b> 202P Flat Beige	<b>Dot Pitch</b> 0.24mm	<b>Max. Res</b> 2048x1536	<b>Hor.Scan.Freq</b> 85	<b>Refresh</b> 130KHz	<b>Price</b> \$1055

**Philips LCD Monitors**


<b>Websearch</b> 223130	<b>15" Product Description</b> 15" 150BSCB Black (Available in Silver)	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1024x768	<b>Hor.Scan.Freq</b> 75	<b>Contrast</b> 450:1	<b>Price</b> \$558
<b>Websearch</b> 223131	<b>17" Product Description</b> 17" 1705FG Beige (Available in Black and Silver)	<b>Pixel Pitch</b> 0.264	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 75	<b>Contrast</b> 450:1	<b>Price</b> \$636
<b>Websearch</b> 223056	<b>19" Product Description</b> 19" 1905CB Black (Available in Silver)	<b>Pixel Pitch</b> 0.294	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 75	<b>Contrast</b> 500:1	<b>Price</b> \$993
<b>Websearch</b> 222022	<b>20" Product Description</b> 20" 200P4VG Beige (Built in Speakers)	<b>Pixel Pitch</b> 0.294	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 75	<b>Contrast</b> 700:1	<b>Price</b> \$1241
<b>Websearch</b> 211451	<b>23" Product Description</b> 23" 230W5V Beige Black (Built in Speakers)	<b>Pixel Pitch</b> 0.255	<b>Max. Res</b> 1600x1280	<b>Hor.Scan.Freq</b> 75	<b>Contrast</b> 400:1	<b>Price</b> \$2458
<b>Websearch</b> 222023	<b>23" Product Description</b> 23" 230W5V (Wide Screen)	<b>Pixel Pitch</b> 0.258	<b>Max. Res</b> 1920x1200	<b>Hor.Scan.Freq</b> 85	<b>Contrast</b> 500:1	<b>Price</b> \$3015
<b>Websearch</b> 222025	<b>30" Product Description</b> 30" 300W5Q Silver (Available in Black)	<b>Pixel Pitch</b> 0.5025	<b>Max. Res</b> 1280x768	<b>Hor.Scan.Freq</b> 60	<b>Contrast</b> 500:1	<b>Price</b> \$4471

**Samsung LCD Monitors**


<b>Websearch</b> 223573	<b>15" Product Description</b> 15" 153V Ivory (Available in Silver)	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1024x768	<b>Hor.Scan.Freq</b> 61	<b>Contrast</b> 350:1	<b>Price</b> \$536
<b>Websearch</b> 210727	<b>15" Product Description</b> 15" 152N Thin Bezel Black (Available in Silver)	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1024x768	<b>Hor.Scan.Freq</b> 61	<b>Contrast</b> 350:1	<b>Price</b> \$562
<b>Websearch</b> 195703	<b>15" Product Description</b> 15" 152T Multimedia Silver	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1024x768	<b>Hor.Scan.Freq</b> 61	<b>Contrast</b> 600:1	<b>Price</b> \$622
<b>Websearch</b> 226106	<b>15" Product Description</b> 15" 152SM Multimedia Dual Hinge Silver	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1024x768	<b>Hor.Scan.Freq</b> 61	<b>Contrast</b> 350:1	<b>Price</b> \$618
<b>Websearch</b> 214306	<b>15" Product Description</b> 15" 150MP Multifunction Silver TV Tuner	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1024x768	<b>Hor.Scan.Freq</b> 61	<b>Contrast</b> 350:1	<b>Price</b> \$722
<b>Websearch</b> 214041	<b>17" Product Description</b> 17" 173V Silver	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 450:1	<b>Price</b> \$638
<b>Websearch</b> 225073	<b>17" Product Description</b> 17" 172N Thin Bezel Black (Available in Silver)	<b>Pixel Pitch</b> 0.264	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 450:1	<b>Price</b> \$684
<b>Websearch</b> 195714	<b>17" Product Description</b> 17" 172T 17" Thin Bezel Dual Hinge	<b>Pixel Pitch</b> 0.264	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 700:1	<b>Price</b> \$780
<b>Websearch</b> 225428	<b>17" Product Description</b> 17" 173P Dual Hinge Black (Available in Silver & Red)	<b>Pixel Pitch</b> 0.264	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 700:1	<b>Price</b> \$940
<b>Websearch</b> 222483	<b>17" Product Description</b> 17" 170MP Multifunction Silver TV Tuner	<b>Pixel Pitch</b> 0.264	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 450:1	<b>Price</b> \$1004
<b>Websearch</b> 210731	<b>19" Product Description</b> 19" 192N Thin Bezel Silver	<b>Pixel Pitch</b> 0.294	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 700:1	<b>Price</b> \$1056
<b>Websearch</b> 210733	<b>19" Product Description</b> 19" 193T Thin Bezel Dual Hinge Black (Available in Silver)	<b>Pixel Pitch</b> 0.294	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 750:1	<b>Price</b> \$1247
<b>Websearch</b> 225426	<b>19" Product Description</b> 19" 193P Dual Hinge Stand Black (Available in Silver & Red)	<b>Pixel Pitch</b> 0.297	<b>Max. Res</b> 1280x1024	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 800:1	<b>Price</b> \$1381
<b>Websearch</b> 209048	<b>21" Product Description</b> 21" 213T Thin Bezel Silver	<b>Pixel Pitch</b> 0.27	<b>Max. Res</b> 1600x1200	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 500:1	<b>Price</b> \$2494
<b>Websearch</b> 214311	<b>24" Product Description</b> 24" 243T Wide Format Silver	<b>Pixel Pitch</b> 0.27	<b>Max. Res</b> 1920x1200	<b>Hor.Scan.Freq</b> 81	<b>Contrast</b> 500:1	<b>Price</b> \$4105
<b>Websearch</b> 214312	<b>32" Product Description</b> 32" 323T Wide Format Silver	<b>Pixel Pitch</b> 0.537	<b>Max. Res</b> 1280x768	<b>Hor.Scan.Freq</b> 70	<b>Contrast</b> 500:1	<b>Price</b> \$4976
<b>Websearch</b> 206775	<b>40" Product Description</b> 40" 403T Wide Format Silver	<b>Pixel Pitch</b> 0.6735	<b>Max. Res</b> 1280x768	<b>Hor.Scan.Freq</b> 70	<b>Contrast</b> 600:1	<b>Price</b> \$9596

**Kensington FlyLight Notebook USB Light**

- No batteries; plugs into any USB port
- Bulb-free LED design never wears out
- Uses less than 90 seconds per hour of battery charge
- Sleek hi-tech design is a perfect accessory for busy travellers
- Flexible neck stays where you put it


**\$19**

Websearch Code 226189

**Kensington Pocket Keypad Calculator**

All-in-one design: numeric keypad and fully functional office calculator in one. Makes number entry on any laptop fast, simple and easy. Detachable USB cable retracts into a small compartment for neat and easy storage.



Pocket Keypad Calculator

**\$49**

Websearch Code 223142

**Kensington Notebook Telephone Cord**

Stay connected on the road with the pocket-sized Kensington Portable Modem Cord! With it eight feet of cord makes it easy to reach that available phone port! A high-quality, one-foot retraction mechanism, keeps everything nice and neat.

- Kensington Portable Ethernet Cord (223144)

\$29



Notebook Telephone Cord

**\$16**

Websearch Code 223140


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click here to buy...

9



### Telstra F2100 DECT Cordless Telephone

- Digital Enhanced Cordless Telephone (DECT) provides digital voice clarity and security.
- Telstra call number display.
- 10 number memory.
- Shows last 10 numbers dialed.
- 13 hours talk time or 12 days standby.
- With additional handset (195178) \$115

With Integrated answering machine



**\$66**

Websearch Code ..... 195177

### Telstra F2150 DECT Cordless Telephone

- Digital Enhanced Cordless Telephone (DECT) with integrated answering machine.
- Shows last 10 callers
- 10 number memory
- Fully digital answering machine with 12 minutes recording time
- Time & date stamping of all incoming messages
- With additional handset (207278) \$156

With Integrated answering machine



**\$107**

Websearch Code ..... 207277

### Telstra F3000 DECT Cordless Telephone

- Digital Enhanced colour screen Cordless Telephone (DECT) provides digital voice clarity and security
- SMK card reader
- Large 4096 colour display
- Large name & number phone-book
- Calling number display
- 2 games included

Polyphonic ring tones, games & alarm clock



**\$189**

Websearch Code ..... 211015

### HP LaserJet 1015

- 600 x 600 dpi
- 14ppm black
- 16MB Ram
- 150 sheet tray
- Parallel/USB
- Win/Mac
- HP 1010 (209726) \$327



1015  
Websearch Code ..... 209727

**\$422**

### HP LaserJet 4200N

- 1200 x 1200dpi
- 35ppm black
- 48MB Ram
- 600 sheet input
- Parallel
- Win/Mac
- Ethernet ready
- HP 4200 RentSmart \$19.88 (196515) \$1814
- HP 4200DTN RentSmart \$32.47 (195314) \$3311



4200N  
RENTSMART \$24.87 PER WEEK  
Websearch Code ..... 196185

**\$2536**

### HP Colour LaserJet 2550N

- 600 x 600dpi
- 19ppm black, 4ppm colour
- 64MB Ram
- 125 sheet multi-purpose tray & 250 sheet input tray
- Win/Mac
- Ethernet ready



2550N  
RENTSMART \$15.52 PER WEEK  
Websearch Code ..... 226053

**\$1416**

### Lexmark T630N

- 1200 x 1200dpi
- 35ppm black
- 64MB Ram
- Up to 350 sheet input
- USB
- Win/Mac
- Ethernet Ready
- T630 RentSmart \$15.66 (207467) \$1429



T630N  
RENTSMART \$18.23 PER WEEK  
Websearch Code ..... 207468

**\$1663**

### HP LaserJet 1300N

- 1200 x 1200dpi
- 20ppm black
- 16MB Ram
- 250 sheet tray
- Parallel/USB
- Win/Mac
- Ethernet ready
- HP 1300 RentSmart \$7.60 (196460) \$593



1300N  
RENTSMART \$11.83 PER WEEK  
Websearch Code ..... 196461

**\$1079**

### HP LaserJet 4300N

- 1200 x 1200 dpi
- 43ppm black
- 80MB Ram
- 600 sheet input
- Win/Mac
- Ethernet ready
- HP 4300DTN RentSmart \$35.12 (206300) \$3581
- HP 4300 RentSmart \$24.30 (196463) \$2478



4300N  
RENTSMART \$30.86 PER WEEK  
Websearch Code ..... 196364

**\$3147**

### HP Colour LaserJet 3500N

- 600 x 600dpi
- 12ppm black & colour
- 64MB Ram
- Up to 350 sheet input
- USB 2.0
- Win/Mac
- Ethernet ready
- HP 3500 RentSmart \$18.73 (212690) \$1709



3500N  
RENTSMART \$21.64 PER WEEK  
Websearch Code ..... 212689

**\$1974**

### HP LaserJet 2300N

- 1200 x 1200dpi
- 25ppm black
- 48MB Ram
- 350 sheet input
- Parallel/USB
- Win/Mac
- Ethernet ready
- HP 2300 RentSmart \$15.38 (196462) \$1403
- HP 2300D RentSmart \$16.72 (196411) \$1525



2300N  
RENTSMART \$19.82 PER WEEK  
Websearch Code ..... 196363

**\$1808**

### HP Colour LaserJet 4650

- 600 x 600dpi
- 21ppm black
- 160MB Ram
- Up to 600 sheet input
- USB & Parallel Connection
- Win/Mac



4650  
RENTSMART \$32.08 PER WEEK  
Websearch Code ..... 225343

**\$3271**

### HP Colour LaserJet 3700

- 600 x 600dpi
- 16ppm black & colour
- 64MB Ram
- Up to 350 sheet input
- USB & parallel
- Win/Mac
- HP 3700D RentSmart \$35.72 (212692) \$3642



3700  
RENTSMART \$24.46 PER WEEK  
Websearch Code ..... 212691

**\$2494**

### Lexmark C510N Colour

- 1200 x 1200dpi
- 30ppm black, 8ppm
- 64 MB Ram
- 250 sheet input
- USB
- Win/Mac
- Ethernet Ready
- C510 RentSmart \$10.47 (223787) \$955
- C510DN RentSmart \$33.76 (223789) \$3442



C510N  
RENTSMART \$22.98 PER WEEK  
Websearch Code ..... 223788

**\$2096**

### Lexmark C752N Colour

- 1200 x 1200dpi
- 19ppm black and colour
- 128 MB Ram
- 600 sheet input
- USB
- Win/Mac
- Ethernet Ready
- C752 RentSmart \$40.70 (223473) \$4355
- C752DN RentSmart \$46.94 (222885) \$5150



C752N  
RENTSMART \$42.35 PER WEEK  
Websearch Code ..... 223833

**\$4531**



### Fuji Xerox DocuPrint 240A

- 1200 x 1200 dpi
- 24ppm black
- 64MB Ram
- 700 sheet input
- USB 1.1
- Ethernet ready
- 12 month on site warranty
- Win/Mac



RENTSMART \$15.69 PER WEEK \$1431  
Websearch Code 214490

### Fuji Xerox DocuPrint 205 A3

- 1200 x 1200 dpi
- 20ppm black
- 64MB Ram
- 400 sheet input
- USB 1.1
- A4 / A3 Printing
- Ethernet ready
- 12 month on site warranty
- Win/Mac



RENTSMART \$19.62 PER WEEK \$1790  
Websearch Code 214489

### Fuji Xerox DocuPrint C1618 Colour

- 1200 x 1200 dpi
- 16ppm black & colour
- 64MB Ram
- 600 sheet input
- USB 1.1
- Ethernet ready
- 12 month on site warranty
- Win/Mac



RENTSMART \$21.66 PER WEEK \$2208  
Websearch Code 213192

### Fuji Xerox Phaser 6250N Colour

- 2400 x 2400 dpi
- 24ppm black & colour
- 256MB Ram
- 600 sheet input
- USB 2
- Ethernet ready
- 12 month on site warranty
- Win/Mac



RENTSMART \$38.10 PER WEEK \$4077  
Websearch Code 211611

### Fuji Xerox DocuPrint C2428N

- 1200 x 1200 dpi
- 24ppm black & colour
- 128MB Ram
- 650 sheet input
- USB 1.1
- Ethernet ready
- Win/Mac



RENTSMART \$45.68 PER WEEK \$4888  
Websearch Code 214488

### Brother HL-4200CN Colour

- 1200 x 1200 dpi
- 24ppm in black & colour
- 64MB Ram
- 500 + 100 sheet input trays
- USB 2.0 & parallel
- Ethernet ready
- Duplex
- Win/Mac



RENTSMART \$29.42 PER WEEK \$3300  
Websearch Code 246706

### Brother HL5140

- 1200 x 1200 dpi
- 20ppm black
- 16MB Ram
- 250 sheet tray
- Parallel/USB
- Win/Mac



RENTSMART \$3.96 PER WEEK \$396  
Websearch Code 246707

### Brother MFC4800

- Multifunction printer
- 600 x 600 dpi
- 10ppm black print and copy
- 2MB Ram
- Fax
- 200 sheet tray
- Parallel/USB
- Win/Mac



RENTSMART \$4.16 PER WEEK \$416  
Websearch Code 195134

### Brother MFC9180

- Multifunction printer
- 600 x 600 dpi
- 10ppm black print and copy
- 8MB Ram
- Fax
- 200 sheet tray
- Parallel/USB
- Win/Mac



RENTSMART \$6.82 PER WEEK \$622  
Websearch Code 192722

### Epson EPL-6200N

- 1200 x 1200 dpi
- 20ppm black
- 8MB Ram
- 250 sheet tray
- Parallel/USB
- Ethernet ready
- Win/Mac
- EPL-6200
- RentSmart \$7.14 (211807) \$651



RENTSMART \$9.33 PER WEEK \$851  
Websearch Code 213423

### Epson Colour C900N

- 600 x 600dpi
- 16ppm black, 4ppm colour
- 64MB Ram
- 200 sheet multi-purpose tray
- Ethernet ready
- Win/Mac
- Epson C900
- RentSmart \$13.46 (196840) \$1228



RENTSMART \$12.46 PER WEEK \$1137  
Websearch Code 200445

### Epson Colour AL-C1900

- 600 x 600 dpi
- 16ppm black
- 4ppm colour
- 96MB Ram
- 200 sheet tray
- Parallel/USB
- Ethernet ready
- Win/Mac



RENTSMART \$15.93 PER WEEK \$1453  
Websearch Code 196841

### Nokia 7200

- Style pack that includes coordinated covers, soft pouch and wrist strap
- Integrated handsfree speaker
- Integrated digital camera
- Alarm clock, Calendar & Calculator
- SMS, MMS, & Chat messaging
- Video clips
- FM stereo radio, Games & Polyphonic ringtones



NEW No Contracts \$792  
Websearch Code 224287

### Nokia 5140

- Integrated handsfree speaker
- Tri-band world phone
- Voice dialing, Commands & Record
- Alarm Clock, Calendar, Calculator & Digital Compass
- Integrated Digital Camera
- SMS, MMS, & chat messaging
- FM stereo radio
- Games
- Polyphonic Ringtones



NEW No Contracts \$561  
Websearch Code 225434

### Nokia 6220

- Integrated handsfree speaker
- Voice dialing, Commands & Recorder
- Phonebook: Contacts with images
- Conference Call, Calendar & Alarm Clock
- Integrated Digital Camera
- Predictive text input, SMS, MMS, Picture messaging, & Email client messaging



NEW No Contracts \$521  
Websearch Code 212388

## Belkin Cable IEEE

- Belkin Cable IEEE 1394, 4 Pin to 4.90cm (150902) \$15
- Belkin Cable IEEE 1394, 4 Pin to 4.1.8m (190898) \$25
- Belkin Cable IEEE 1394, 6 Pin to 4.90cm (190533) \$16
- Belkin Cable IEEE 1394, 6 Pin to 4.1.8m (190809) \$25
- Belkin Cable IEEE 1394, 6 Pin to 6.1.8m (190807) \$25
- Belkin Cable Firewire 800/400 9pin-4pin, 1.8m 39 (223847) \$39
- Belkin Cable Firewire 800/400 9pin-6pin, 1.8m 39 (223848) \$39
- Belkin Cable Firewire 800/400 9pin-6pin, 4.5m 55 (223849) \$55
- Belkin Cable Firewire 800/400 9pin-9pin, 1.8m 44 (223851) \$44
- Belkin Cable Firewire 800/400 9pin-9pin, 4.5m 55 (223852) \$55



## Belkin Patch Cable CAT5e

- Belkin Patch Cable CAT5e Snagless 1m (212655) \$7
- Belkin Patch Cable CAT5e Snagless 5m (212657) \$15
- Belkin Patch Cable CAT5e Snagless 10m (212658) \$20
- Belkin Patch Cable CAT5e Snagless 15m (212659) \$25

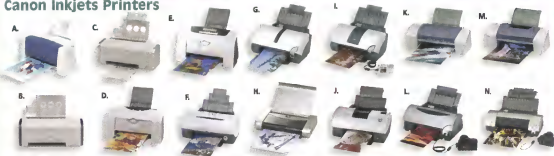


## Belkin USB Peripheral Cables

- Belkin USB Peripheral Cable A-B 1.8m (BEL148) \$12
- Belkin USB Peripheral Cable A-B 3m (BEL149) \$17
- Belkin USB Peripheral Cable A-B 5m (190572) \$22



## Canon Inkjets Printers



Webcode	Product Description	Black	Colour	Resolution	USB	Parallel	Platform	Price
A. 209228	Canon S200SPX Inkjet Printer	5ppm	3ppm	2880 x 720 dpi	Yes		Win/Mac	\$71
B. 208752	Canon I250 Inkjet Printer	12ppm	9ppm	4800 x 1200 dpi	Yes		Win/Mac	\$88
C. 208753	Canon I350 Inkjet Printer	16ppm	11ppm	4800 x 1200 dpi	Yes		Win/Mac	\$125
D. 223001	Canon i455 Inkjet Printer	18ppm	12ppm	4800 x 1200 dpi	Yes		Win/Mac	\$159
E. 211986	Canon i4750 Inkjet Printer	18ppm	12ppm	4800x1200dpi	Yes		Win/Mac	\$239
F. 209573	Canon i560 Inkjet Printer	22ppm	15ppm	4800 x 1200dpi	Yes		Win/Mac	\$229
G. 209574	Canon i865 Inkjet Printer	23ppm	16ppm	4800 x 1200 dpi	Yes	Yes	Win/Mac	\$299
H. 222700	Canon i80 Inkjet Printer (Portable)	14ppm	10ppm	4800x1200dpi	Yes		Win/Mac	\$385
I. 224431	Canon i965 Inkjet Printer	10ppm	10ppm	4800 x 1200 dpi	Yes		Win/Mac	\$45
J. 210668	Canon i950 Inkjet Printer	8ppm	7ppm	4800 x 1200 dpi	Yes		Win/Mac	\$529
K. 196658	Canon i6100 Inkjet Printer (A3+)	12ppm	9ppm	2400 x 1200 dpi	Yes	Yes	Win/Mac	\$522
L. 223837	Canon i990 Inkjet Printer	16ppm	12ppm	4800x2400dpi	Yes		Win/Mac	\$599
M. 196659	Canon i5500 Inkjet Printer (A3+)	17ppm	12ppm	4800 x 1200 dpi	Yes	Yes	Win/Mac	\$699
N. 224185	Canon i9950 Inkjet Printer (A3+)	16ppm	12ppm	4800 x 2400 dpi	Yes		Win/Mac	\$880

## Canon Multifunction Printers



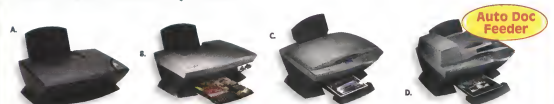
Websearch	Product Description	Black	Colour	Print Resolution	Scan Resolution	Copy - Black	Fax	Connectivity	Platform	Price
A. 195871	Canon Imageclass MPC190	14ppm	10ppm	2400 x 1200 dpi	600 x 1200 dpi	14ppm	USB	Win	Win	\$159
B. 211989	Canon Imageclass MP360	18ppm	12ppm	4800 x 1200 dpi	1200 x 2400 dpi	18ppm	USB	Win	Win	\$259
C. 211990	Canon Imageclass MP370	18ppm	12ppm	4800 x 1200 dpi	1200 x 2400 dpi	18ppm	USB	Win	Win	\$299
D. 225444	Canon Imageclass MP390	18ppm	12ppm	4800 x 1200 dpi	1200 x 2400 dpi	18ppm	Yes	USB	Win	\$375
E. 196661	Canon Imageclass MP700	22ppm	14ppm	4800 x 1200 dpi	1200 x 2400 dpi	22ppm	USB	Win	Win	\$399
F. 197558	Canon Imageclass MP730	22ppm	14ppm	4800 x 1200 dpi	1200 x 2400 dpi	22ppm	Yes	USB	Win	\$499

## Lexmark Inkjet printers



Webcode	Product Description	Black	Colour	Resolution	USB	Parallel	Platform	Price
A. 202448	Lexmark 2603 Inkjet Printer	14ppm	8ppm	4800 x 1200 dpi	Yes		Win/Mac	\$63
B. 202449	Lexmark 2605 Inkjet Printer	14ppm	8ppm	4800 x 1200 dpi	Yes		Win/Mac	\$79
C. 209513	Lexmark P707 Photo Inkjet Printer	17ppm	10ppm	4800 x 1200 dpi	Yes		Win/Mac	\$157

## Lexmark Multifunction printers



Webcode	Product Description	Black	Colour	Print Resolution	Scan Resolution	Copy - Black	Fax	Connectivity	Platform	Price
A. 224262	Lexmark X2250 Multifunction Printer	14ppm	8ppm	4800 x 1200 dpi	600 x 1200 dpi	14ppm	USB	Win/Mac	Win/Mac	\$158
B. 211102	Lexmark P3150 Multifunction Printer	19ppm	15ppm	4800 x 1200 dpi	1200 x 4800 dpi	16ppm	Yes	USB	Win	\$317
C. 211187	Lexmark X6150 Multifunction Printer	19ppm	15ppm	4800 x 1200 dpi	1200 x 4800 dpi	16ppm	Yes	USB	Win	\$394

## HP Inkjets Printers



Webcode	Product Description	Black	Colour	Resolution	USB	Parallel	Platform	Price
A. 197427	HP Deskjet 3550 Inkjet Printer	14ppm	100ppm	2400 x 1200 dpi	Yes		Win/Mac	\$86
B. 207744	HP Deskjet 3650 Inkjet Printer	17ppm	120ppm	Up to 4800dpi	Yes		Win/Mac	\$129
C. 208633	HP Deskjet 5160 Inkjet Printer	18ppm	14ppm	Up to 4800dpi	Yes		Win/Mac	\$172
D. 210213	HP Photosmart 7260 Inkjet Printer	N/A	N/A	Up to 4800dpi		Yes	Win/Mac	\$172
E. 207745	HP Deskjet 5652 Inkjet Printer	21ppm	15ppm	Up to 4800dpi	Yes	Yes	Win/Mac	\$258
F. 210214	HP Photosmart 7660 Inkjet Printer	N/A	N/A	4800 x 1200dpi	Yes		Win/Mac	\$259
G. 192208	HP Deskjet 1180c Inkjet Printer (A3)	8ppm	7ppm	Up to 1200dpi	Yes	Yes	Win/Mac	\$387
H. 192097	HP Deskjet 4500c Inkjet Printer (Portable)	9ppm	8ppm	Up to 4800dpi	Yes		Win/Mac	\$405
I. 210212	HP Photosmart 7960 Inkjet Printer	N/A	N/A	4800 x 1200dpi	Yes		Win/Mac	\$520

## HP Multifunction Printers



Websearch	Product Description	Black	Colour	Print Resolution	Scan Resolution	Copy - Black	Fax	Connectivity	Platform	Price
A. 210591	HP Officejet PSC1315	17ppm	12ppm	1200 x 1200 dpi	600 x 2400 dpi	12ppm		USB	Win/Mac	\$185
B. 211676	HP Officejet PSC1350	17ppm	12ppm	600 x 600 dpi	600 x 600 dpi	17ppm		USB	Win/Mac	\$232
C. 226123	HP Officejet PSC2310	21ppm	15ppm	4800 x 1200 dpi	1200 x 2400 dpi	21ppm		USB	Win/Mac	\$336
D. 214043	HP Officejet 5510	17ppm	12ppm	1200 x 1200 dpi	600 x 2400 dpi	17ppm	Yes	USB	Win/Mac	\$345
E. 210833	HP Officejet PSC2410	21ppm	15ppm	4800 x 1200 dpi	1200 x 2400 dpi	21ppm	Yes	USB	Win/Mac	\$432
F. 194905	HP Officejet 6110	19ppm	15ppm	1200 x 1200 dpi	1200 x 2400 dpi	19ppm	Yes	USB	Win/Mac	\$516
G. 211675	HP Officejet PSC2510	21ppm	15ppm	4800 x 1200 dpi	1200 x 2400 dpi	21ppm	Yes	USB	Win/Mac	\$520
H. 197333	HP Officejet 7130	22ppm	18ppm	2400 x 1200 dpi	1200 x 4800 dpi	22ppm	Yes	USB	Win/Mac	\$736

## Epson Inkjet Printers



Webcode	Description	Black	Colour	Resolution	USB	Parallel	Platform	Price
A. 200432	Epson Stylus C43UX Inkjet Printer	12ppm	5.4ppm	Up to 2880dpi	Yes		Win/Mac	\$85
B. 200433	Epson Stylus C43SX Inkjet Printer	12ppm	5.4ppm	Up to 2880dpi	Yes	Yes	Win/Mac	\$184
C. 211329	Epson Stylus C83 Inkjet Printer	17ppm	14ppm	5760 x 1440dpi	Yes	Yes	Win/Mac	\$152
D. 221900	Epson Stylus Photo R210 Inkjet Printer	15ppm	15ppm	5760x1440dpi	Yes		Win/Mac	\$212
E. 212325	Epson Stylus C83 Inkjet Printer	22ppm	12ppm	5760 x 1440dpi	Yes		Win/Mac	\$256
F. 214621	Epson Stylus Photo R310 Inkjet Printer	15ppm	15ppm	5760x1440dpi	Yes		Win/Mac	\$339
G. 208873	Epson Stylus Colour 1160 Printer (A3)	9.5ppm	9.2ppm	1440 x 720 dpi	Yes	Yes	Win/Mac	\$464
H. 225370	Epson Stylus Photo 8800 Printer	17ppm	8ppm	5760 x 1440	Yes		Win/Mac	\$592
I. 194129	Epson Stylus Photo 1290 Silver Inkjet Printer (A3)	9.4ppm	9ppm	Up to 5760dpi	Yes		Win/Mac	\$780
J. 222825	Epson Stylus Photo 2100 Inkjet Printer (A3)	7.5ppm	7.3ppm	2880 x 1440dpi	Yes	Yes	Win/Mac	\$1280
K. 190522	Epson Stylus 3000 Inkjet Printer (A2)	NA	NA	1440x720dpi	Yes		Win/Mac	\$1888

## Epson Multifunction Printers

Webcode	Description	Black	Colour	Print Resolution	Scan Resolution	Copy-Black	Connectivity	Platform	Price
A. 196271	Epson Stylus CX3100	14ppm	14ppm	5760 x 720dpi	600 x 1200dpi	10ppm	USB	Win/Mac	\$211
B. 211183	Epson Stylus CX5300	22ppm	11ppm	5760 x 1440dpi	1200 x 2400dpi	15ppm	USB	Win/Mac	\$338
C. 212404	Epson RX510 (Photo)	17ppm	10ppm	5760 x 1400 dpi	2400 x 4800 dpi	10ppm	USB	Win/Mac	\$506

## HP Papers

- A4 Everyday Photo Semi Gloss 170gsm  
100 Sheets (224383) **\$17**
- A4 Premium Inkjet 98gsm  
200 Sheets (192820) **\$33**
- A4 Everyday Paper 46gsm  
1 Ream (208028) **\$8**
- 5 Reams (222976) **\$39**

## Canon Papers

- A4 High Resolution 110gsm  
50 Sheets (192789) **\$13**
- A4 High Resolution 110gsm  
200 Sheets (194579) **\$33**
- A3 High Resolution 110gsm  
20 Sheets (196358) **\$10**
- 100 Sheets (196198) **\$42**

## Kodak Papers

- 4 x 6" Picture Paper  
20 Sheets (195432) **\$10**
- 40 Sheets (212721) **\$15**
- 4 x 6" Premium Picture Paper  
25 Sheets (208417) **\$15**
- 75 Sheets (208414) **\$32**
- A4 Everyday Picture Paper 165gsm  
20 Sheets (195444) **\$10**
- 100 Sheets (208412) **\$35**
- A4 Picture Paper Glossy 190gsm  
25 Sheets (195434) **\$15**
- 75 Sheets (202113) **\$33**
- A4 Premium Picture Paper Glossy 220gsm  
15 Sheets (189553) **\$15**
- 50 Sheets (189631) **\$33**
- A4 Premium Picture Paper Satin 220gsm  
20 Sheets (189301) **\$15**
- 50 Sheets (195442) **\$33**

## Epson Papers

- Photo Quality Inkjet Paper 100 Sheets  
A4 (EP5451) **\$27**
- A3 (196187) **\$64**
- A3+ (194822) **\$79**
- Matte Heavyweight Paper 50 Sheets  
A4 (EP5454) **\$27**
- A3 (189993) **\$65**
- A3+ (200355) **\$81**
- Photo Glossy Paper 20 Sheets  
A4 (190157) **\$20**
- A3 (EP5453) **\$68**
- A2 (196329) **\$105**
- Premium Photo Glossy Paper 50 Sheets 4 x 6" (211436) **\$14**
- 20 Sheets A4 (EP5001) **\$32**
- A3 (EP5416) **\$78**
- A3+ (200401) **\$115**



## Syscan

## TravelScan 860

The TravelScan 860 is a business card scanner which interfaces to any standard USB port. It is bundled with Syscan 8CR business card software providing first-class business card recognition and ease of use.

Automatically perform text recognition of the card (OCR) and save both the text and the image.

**\$245**

Websearch Code 190180

## Syscan

## TravelScan 464

At only 335 grams, the TravelScan 464 seems like a light weight but it packs plenty of punch. It features USB2 interface, 600 optical resolution and the versatile PageManager 6 document management software. Scan an A4 page in as little as 25 seconds. Free from clumsy power adapters: plugs straight into your PC's USB port.

**\$299**

Websearch Code 222873

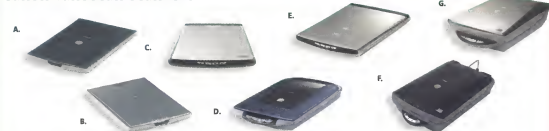
## Fujitsu Fi-4120CU scanner

Designed to occupy minimal desk space, the Fujitsu Fi-4120CU document scanner features true duplex colour scanning, both sides of a document being scanned at the same time in a single pass. It also boasts an impressive 25ppm scanning speed, 50 page automatic-feeder capacity and both USB & SCSI ports.

**HOT PRICE!****\$1285**

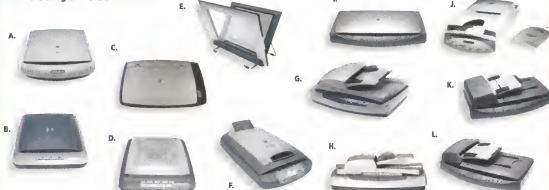
Websearch Code 207416

## Canon CanoScan Scanners



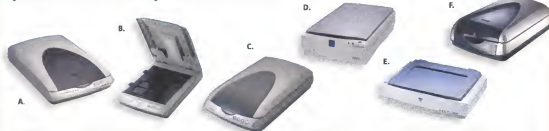
Websearch	Product Description	Resolution	Connectivity	Platform	Price
A. 195688	Canon CanoScan LIDE 20 Scanner	600 x 1200 dpi	USB	Win/Mac	\$88
B. 195876	Canon CanoScan LIDE 30 Scanner	1200 x 2400 dpi	USB2	Win/Mac	\$135
C. 195877	Canon CanoScan LIDE 30 Scanner	1200 x 2400 dpi	USB2	Win/Mac	\$179
D. 211992	Canon CanoScan C3200F Scanner with Transparency Adaptor	1200 x 2400 dpi	USB	Win/Mac	\$219
E. 209576	Canon CanoScan LIDE 80 Scanner with Transparency Adaptor	2400 x 4800 dpi	USB2	Win/Mac	\$253
F. 224186	Canon CanoScan C5200F Scanner with Transparency Adaptor	2400 x 4800 dpi	USB2	Win/Mac	\$308
G. 195879	Canon CanoScan 9900F Scanner with Transparency Adaptor	3200 x 6400 dpi	USB2 / Firewire	Win/Mac	\$599

## HP Scanjet Scanners



Websearch	Product Description	Resolution	Connectivity	Platform	Price
A. 208636	HP Scanjet 2400C Scanner	1200 x 1200 dpi	USB	Win/Mac	\$129
B. 208637	HP Scanjet 3670C Scanner with Transparency Adaptor	1200 x 1200 dpi	USB	Win/Mac	\$215
C. 196263	HP Photosmart 1200 Photo Scanner (Portable)	1200 x 1200 dpi	USB	Win/Mac	\$215
D. 208635	HP Scanjet 3970C Scanner with Transparency Adaptor	2400 x 2400 dpi	USB	Win/Mac	\$344
E. 212025	HP Scanjet 4670 Scanner	2400 x 2400 dpi	USB	Win/Mac	\$430
F. 211910	HP Scanjet 5530 Photosmart Scanner with Transparency Adaptor	2400 x 4800 dpi	USB	Win/Mac	\$516
G. 191415	HP Scanjet 5550C Scanner with Doc Feeder	2400 x 2400 dpi	USB2	Win/Mac	\$861
H. 224920	HP Scanjet 5590 with Transparency Adaptor	2400 x 2400 dpi	USB	Win/Mac	\$866
I. 207761	HP Scanjet 8200 Scanner with Transparency Adaptor	4800 x 4800 dpi	USB	Win/Mac	\$966
J. HP5050	HP Scanjet 7450C Scanner with Doc Feeder	2400 x 2400 dpi	USB / SCSI	Win/Mac	\$1408
K. 211825	HP Scanjet 8250 Scanner with Doc Feeder	4800 x 4800 dpi	USB	Win/Mac	\$1606
L. 211826	HP Scanjet 8290 Scanner with Doc Feeder	4800 x 4800 dpi	USB	Win/Mac	\$2676

## Epson Perfection/Expression Scanners



Websearch	Product Description	Resolution	Connectivity	Platform	Price
A. 208227	Epson Perfection 1670 Scanner	1600 x 3200 dpi	USB	Win/Mac	\$208
B. 208228	Epson Perfection 1670 Photo Scanner with Transparency Adaptor	1600 x 3200 dpi	USB	Win/Mac	\$254
C. 209805	Epson Perfection 3170 Photo Scanner with Transparency Adaptor	3200 x 6400 dpi	USB2	Win/Mac	\$552
D. 212994	Epson Perfection 4870 Photo Scanner with Transparency Adaptor	4800 x 9600 dpi	USB / Firewire	Win/Mac	\$743
E. EP5457	Epson Expression 1680 Scanner	1600 x 3200 dpi	USB / SCSI	Win/Mac	\$1901
F. 197343	Epson Expression 1640XL Scanner (A3)	1600 x 3200 dpi	USB / SCSI	Win/Mac	\$5167



## NetComm Wireless 802.11g PCMCIA Card (NP5430)

NetComm's new NP5430 32-bit 11g Wireless PCMCIA Card makes it quicker and easier for laptop users to keep up to date with e-mail, utilize network resources such as printer and storage and access the Internet. NetComm's WLAN solutions deliver standard-based 802.11g connectivity, protected with the latest 128-bit WEP security keeping your communication safe from prying eyes.



**\$85**

Websearch Code: 207592

## NetComm Wireless 802.11g PCI Card (NP5420)

Add the latest Wi-Fi wireless functionality to your desktop PC with this top-rated NetComm Wireless Networking Adaptor. Connect to and work in harmony with any other 802.11g or 802.11b wireless device, including routers, Wireless Access Points, laptops with wireless built in, and other Wireless Adaptors. Installation is straightforward. With full PCI 2.1 compatibility, the Adaptor just slips into a vacant PC slot in your PC.



**\$91**

Websearch Code: 209999

## NetComm 802.11g Wireless Access Point (NP5400)

Access Point combines the enhanced performance of the new 802.11g standard with the widely deployed 802.11b standard to protect your investment in your existing Wireless LAN infrastructure.



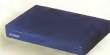
**\$215**

Websearch Code: 207981

## NetComm 10/100Mbps SmartSwitch (NP2008)

### Features:

- 10/100Mbps half/full duplex auto-sensing switch ports
- Intelligent 'Store & Forward' Technology
- Easy Plug & Play configuration
- Increase network speed and decrease chatter



**\$83**

Websearch Code: NE1243

**\$91**

Websearch Code: NE1242

## NetComm ADSL Ethernet Modem/Router and 4 Port Switch (NB1300)

This new, enhanced version of NetComm's top-selling multi-user Ethernet ADSL modem includes USB functionality, advanced Router features as well as a four-port Ethernet switch to connect a network of computers to an ADSL Internet service, allowing more than one user to share a single ADSL account.



**\$29**

Websearch Code: 130964

## NetComm Internal V92 56K Modem (NM5699)

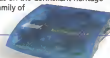
Now on an elegant red and gold circuit board, the new, updated, iModem 56K delivers high-speed voice, data and fax transmission in an easy-to-install and trouble-free PCI format. In addition to its up-to-date feature-set, the new iModem 56K features its own on-board DSP (Digital Signal Processor) for top-notch CPU performance.



## NetComm Roadster V.92 Data/Fax/Voice Modem (AM5055)

### Features:

- QuickConnect cuts the time it takes to connect.
- V.44 compression speeds Web browsing and download speeds.
- The Roadster builds on the Connectix heritage of the Roadster family of proven reliability, increased data transfer speeds and optimised connection rates.



**\$155**

Websearch Code: 202945

**\$152**

Websearch Code: 202951

## NetComm Wireless Firewall Router NB5540

### Features:

- Fast 54Mbps wireless - 802.11g standard
- 5 VPN endpoints
- Backwards Compatible with 11Mbps - 802.11b standard
- Active firewall to protect from Internet hackers



**\$224**

Websearch Code: 207983

## Belkin Wireless 802.11g Router & Network Card Bundle

The Belkin 802.11g Wireless Cable/DSL Gateway Router lets users share files and a broadband Internet connection among their computers without using networking cables. It features 802.11g technology that makes accessing files and networked peripherals such as hard drives, printers, CD-ROMs, and DVDs easier than ever. 802.11g technology provides you with networking speeds nearly five times faster than the current Wi-Fi (802.11b) standard. An integrated, 4-port 10/100Base-T Ethernet switch also allows you to connect wired computers to the network. 802.11g technology is the easiest wireless network to implement.



**\$215**

Websearch Code: 214615

Websearch Code: 214614

## Belkin Wireless Desktop Network Card

The 54g Wireless Desktop Network Card features breakthrough 54g technology that makes wireless file transfers and downloads faster than ever before.

- Transfer speeds up to 54Mbps
- 3 minute Smart Setup Wizard
- Lifetime warranty
- Win/Mac



**\$39**

Websearch Code: 195608

**\$69**

Websearch Code: 224623

## Belkin Wireless Notebook Network Card

Belkin networking presents its latest innovation, the 54g Wireless Notebook Network Card. The Card works as an ideal standalone to give you instant networking capabilities.

- Transfer speeds up to 54Mbps
- 3 minute Smart Setup Wizard
- Lifetime warranty
- Win/Mac



**\$39**

Websearch Code: 189453

**\$69**

Websearch Code: 196291

## Belkin Wireless 802.11g Print Server

Easily add two USB printers to your wireless, or wired network. It features 802.11g technology that makes sending print jobs faster than ever, and includes a memory buffer that handles your graphics jobs effortlessly. Compatible with most USB, network-ready printers, and major operating systems.



**\$199**

Websearch Code: 223784

## Belkin Wireless 802.11g Network Access Point

Belkin networking presents its latest innovation, the 802.11g Wireless Network Access Point (WAP). The 802.11g WAP connects to your network switch and lets you join your wireless-equipped PCs to your wired network.



**\$139**

Websearch Code: 226111

**\$149**

Websearch Code: 224405

## Belkin 802.11g Wireless Router & 4 Port Switch

The Gateway Router uses the wireless 802.11g 2.4GHz standard to offer you the widest working range up to 1800 feet and greater interoperability in mixed networking environments.



**\$199**

Websearch Code: 196297





### Altec Lansing 220 Speaker

This two-piece system works well for music and gaming.

- 10 Watts of total system power
- Quality stereo
- Built-in controls
- Headphone jack
- Total connectivity
- Distinctive, all-decor styling
- Easy set-up



**\$49**

Websearch Code.....190483

### Altec Lansing 221 Speaker

This 3-piece system is a sturdy system for music and gaming that fits on your desktop and within your budget.

- 50 Watts of Total System Power
- 25 Watts RMS
- Compact Subwoofer
- Built-in Controls
- Headphone Jack
- Headphone Stereo
- Distinctive, All-Decor Styling
- Color-Coded Cables



**\$79**

Websearch Code.....190484

### Altec Lansing 2100 Speaker

With a unique, futuristic look and the 2100 a terrific 3-piece PC speaker system.

- 50 Watts
- High Performance Micro Drivers
- Ported, Dual Subwoofer Drivers
- Digital Controller
- Cast Alloy Stands



**\$129**

Websearch Code.....222752

### D-Link DWL-905+ AirPlus 22Mbps Wireless Lan Starter Kit 2 x DWL-650+ Enhanced 2.4GHz Wireless Lan PCMCIA Cards

The D-Link AirPlus DWL-650+ CardBus Adapter is an enhanced 802.11b CardBus. Fully compatible with the IEEE 802.11b standard making it interoperable with all existing 802.11b compliant devices. The DWL-650+ also features 256-bit WEP encryption providing you a higher level of security for your data and communications.

- Up to 22Mbps Data Transfer
- 802.11b Compatible
- 64/128/256-bit Data Encryption

#### DWL-900AP+ Enhanced 2.4GHz Wireless Access Point

An enhanced 802.11b Wireless Access Point featuring advanced silicon chip design.

The DWL-900AP+ includes an embedded DHCP server that once enabled will automatically assign IP addresses to wireless clients. It also eliminates the need for a separate DHCP server on the network. This unique feature is ideal for quickly creating a wireless local area network whether in offices or other workplaces or a temporary network at trade shows or other events. The DWL-900AP+ also features 256-bit WEP encryption for a higher level of security for your data and wireless communications.

- 802.11b Compatible
- 64/128/256-bit Data Encryption



**\$263**

Websearch Code.....200287

### D-Link Wireless Lan PCMCIA Adapter (DWL-G650+)

The DWL-G650+ Wireless CardBus adapter is an enhanced 802.11g high-performance, wireless adapter for notebook computers. Supporting high-speed wireless networking of up to 54Mbps, while providing seamless interoperability with all existing 802.11b and 802.11b+ wireless equipment.

54

G650 108Mbps  
**\$109**

Websearch Code.....200263

G650+ 54Mbps  
**\$75**

Websearch Code.....210414

### D-Link Wireless Lan PCI Adapter (DWL-G520+)

The DWL-G520+ wireless PCI card is an enhanced 802.11g high-performance, wireless card for desktop computers. This card supports high-speed wireless networking of up to 54Mbps, while providing seamless interoperability with all existing 802.11b and 802.11b+ wireless equipment.

54

G520 108Mbps  
**\$143**

Websearch Code.....200292

G520+ 54Mbps  
**\$88**

Websearch Code.....210413

### D-Link Wireless Lan Access Point (DWL-2000AP+)

The DWL-2000AP+ is an enhanced high-performance 802.11g wireless Access Point for use indoors. This device supports wireless networking speeds of up to 54Mbps, while providing seamless interoperability with all existing 802.11b and 802.11b+ wireless equipment.

54

DWL-2000AP 108Mbps  
**\$246**

Websearch Code.....200294

DWL-2000AP+ 54Mbps  
**\$158**

Websearch Code.....210415

### D-Link Wireless Cable/ DSL Router (DI-624+)

The DI-624+ is a high-speed 2.4GHz 802.11g wireless broadband Router with a built-in 4-port Fast Ethernet Switch. It incorporates high-speed wireless LAN with speeds of up to 54Mbps. This router lets you quickly share DSL or cable modem Internet connection, with or without the network wires.



DI-624 108Mbps  
**\$237**

Websearch Code.....200295

DI-624+ 54Mbps  
**\$162**

Websearch Code.....210416

### D-Link Ethernet Print Server (DP-301+)

Compared to software-based printer sharing, the DP-301+ eliminates the need to have your printer connected to a host computer. With the DP-301+, everyone on your network can be sure that their printing jobs go through at any time. Documents also print faster from the DP-301+ than from software-based printer sharing solutions.



DP-300U  
**\$253**

Websearch Code.....200271

DP-301+  
**\$133**

Websearch Code.....222902

### D-Link Dual Speed Switch (DES-1008D)

D-Link DES-1008D is an unmanaged 10/100Mbps switch designed to enhance small workgroup performance while providing a high level of flexibility. Plug any port to either a 10Mbps or 100Mbps network to multiply bandwidths, boost response time and satisfy heavy load demands. 8-port 10/100Mbps Auto-sensing.



DES-1008D  
**\$72**

Websearch Code.....DLK054

DES-1005D  
**\$55**

Websearch Code.....DLK055

### D-Link Wireless Lan USB Adapter (DWL-120+)

The DWL-120+ wireless LAN USB Adapter connects your computer to a wireless LAN. The adapter simply plugs to a USB 1.1 port of your computer, uses the 802.11b standard capable of up to 22Mbps network transfer data rates, and provides data encryption of 64, 128 or 256 bits for security.



G122  
**\$73**

Websearch Code.....211404

G120+  
**\$76**

Websearch Code.....209513

### D-Link Ethernet Broadband Router (DI-704P)

Ethernet Broadband Gateway with a built-in four port switch plus a print server function. Provides the ability to share a single Ethernet Cable or DSL broadband connection and share a single printer among computers connected to the local network. Equipped with four 10/100Mbps Fast Ethernet ports and a bi-directional LPT port to support a direct printer connection.



DI-704P  
**\$103**

Websearch Code.....190311

DI-707P  
**\$160**

Websearch Code.....190508

### D-Link ADSL Router for SOHO Networks (DSL-500)

Combines ADSL broadband WAN connection with IP routing, transparent bridging and Internet gateway functions, all in one compact box. An ADSL modem is built into this device. It also acts as a broadband Internet gateway for your SOHO. Cost-saving Internet functions NAT and DHCP are provided, allowing your entire office to share one single broadband line and one single ISP account.



DSL-504G  
**\$185**

Websearch Code.....224400

DSL-500  
**\$122**

Websearch Code.....190514

**iswh**Hardware  
Software  
Consumables

Networking

AUGUST/SEPTEMBER 2004

**Netgear Wireless PCMCIA Adapter (WG511)**

- Works with both IEEE 802.11b and 802.11g
- Speeds of up to 54 Mbps
- Office roaming for notebook PC users
- Shared broadband Internet access and resources
- Wireless LAN Manager for location-specific profiles
- 128-bit WEP encryption



802.11B MA521

**\$44**

Websearch Code... 203250

802.11G WG511

**\$80**

Websearch Code... 195607

**Netgear Wireless PCI Adapter (WG311)**

- High-speed 802.11g at 2.4 GHz
- First-time-ever wireless video streaming
- Dynamic rate shifting
- 40/64 & 128-bit Wired Equivalency Protection encryption
- Virtual Private Network pass-through



802.11B MA311

**\$123**

Websearch Code... 213270

802.11G WG311

**\$92**

Websearch Code... 207056

**Netgear Wireless USB Adapter (WG121)**

- Works with both IEEE 802.11b and 802.11g
- USB 2.0 powered
- Sleek, attractive platinum casing
- Easy setup via Smart Wizard install assistant



802.11B MA111

**\$68**

Websearch Code... 197322

802.11G WG121

**\$111**

Websearch Code... 211346

**Netgear Wireless Access Point (WG602)**

- Works with both IEEE 802.11b and 802.11g
- Provides the highest available level of WEP encryption 128bit for both
- MAC address authentication offers enhanced security by ensuring only authorised users can access the network
- Dynamic rate shifting according to environmental conditions achieves the fastest possible connections



802.11B ME103

**\$267**

Websearch Code... 203250

802.11G WG602

**\$157**

Websearch Code... 195606

**Netgear Wireless Access Point and Print Server (FWG114P)**

- True Firewall with Stateful Packet Inspection and Intrusion Detection
- Built-in 54 Mbps/802.11g Wireless Access Point
- Integrated USB Print Server & Network Address Translation (NAT) Routing
- D8/B port included to support an ISDN or analogue modem connection
- Easy to use Smart Wizard install Assistant



802.11B FM114P

**\$218**

Websearch Code... 193171

802.11G FWG114P

**\$298**

Websearch Code... 211347

**Netgear Wireless Access Point and Router (WGR614)**

- Faster Speeds up to 54 Mbps in 2.4 GHz mode
- Share your Cable/DSL Internet connection - with or without wires
- Smart Wizard: automatically detects and connects to your ISP
- True Firewall with SPI and NAT protection
- Easy set up with interactive install tutorial



802.11B MR614

**\$103**

Websearch Code... 195602

802.11G WGR614

**\$130**

Websearch Code... 196393

**Netgear Wireless Ethernet Bridge (WGE101)**

- Multi-device bridging mode supports connection to multiple Ethernet devices via a hub, router or switch
- Detachable antennas create uniform blanket coverage without dead spots
- Supports Ad-Hoc mode ideal for small networks, it can communicate with other devices with an requiring an access point.



802.11B ME101

**\$138**

Websearch Code... 222968

802.11G WGE101

**\$182**

Websearch Code... 207057

**Netgear 10/100 Fast Ethernet Switch (FS608)**

- Plug and Play installation, no configuration
- Auto-detects speed and duplex
- Auto Uplink makes the right connection
- 100 Mbps access/200 Mbps in full-duplex
- Vertical option saves space on your desk



5 Port FS605

**\$47**

Websearch Code... 194999

8 Port FS608

**\$76**

Websearch Code... 195000

**Netgear 10/100 Fast Ethernet Switch (JFS524)**

- 24 10/100 ports
- Plug and Play
- Auto-detects speed and duplex
- Auto Uplink Technology makes the right connection
- Rack mount kit included



16 Port JFS16

**\$159**

Websearch Code... NET209

24 Port JFS24

**\$199**

Websearch Code... 195697

**Netgear Cable/DSL Prosafe VPN Firewall Router (FVS318)**

- Initiates up to 8 IPSec VPN tunnels simultaneously
- Stateful Packet Inspection Firewall with VPN pass-through and routing
- Eight ultra-fast 10/100 Mbps LAN ports
- Securely connects mobile workforce and branch offices to main office resources
- Easy-to-use Web browser-based setup, configuration and remote management

**\$223**

Websearch Code... 193164

**Netgear ADSL Modem (DM602)**

- Ethernet and USB connections
- 8 mbps high-speed Internet surfing
- Use phone while you're online
- Supports all ADSL networks
- Simple to use

**\$110**

Websearch Code... 195411

**Netgear Cable/DSL Web Safe Router (RP614)**

- Unique Smart Wizard and Remote Assistant make setup a breeze
- Lightning fast cable/DSL Internet sharing with integrated 4-port switch
- NAT Firewall with VPN pass-through protects against hackers
- Connects up to 253 network users
- Parents may restrict and monitor access to inappropriate Web sites
- Instant alerts and regular e-mail notification of browser activity

**\$95**

Websearch Code... 208503

**Logitech X-620 Speakers**

- Immerse yourself in sound with the subwoofer and six satellite speakers
- Hear the action behind you for greater gaming intensity with rear center channel
- Enjoy twice the bass of conventional designs with our patented subwoofer
- Place the satellites on a shelf or mount them to a wall

**\$135**

Websearch Code... 214295

**Logitech Z-5300 Speakers**

- With five satellite speakers and subwoofer immerse yourself in sound. Coming complete with a remote control with a LCD screen and an adapter to hook up your games console. Change your music experience today.

**\$270**

Websearch Code... 214295

**Logitech Z-680 Speakers**

- Gives you THX-certified theatre quality digital sound through optical and coaxial inputs for simple connection to nearly any audio appliance. The 5.1 configuration with Dolby Digital and DTS Decoding pumps bass through the 188-watt subwoofer and with each of the four satellites providing 62 watts (RM5) and a 69-watt centre channel you have crystal-clear midrange and high notes.

**\$480**

Websearch Code... 194855

**www.iswh.com.au**

click here to buy...

17

### Secure Digital Cards

- Sandisk Secure Digital Card 64MB (224416) \$44
- Sandisk Secure Digital Card 128MB (211595) \$66
- Sandisk Secure Digital Card 256MB (211596) \$99
- Sandisk Secure Digital Card 512MB (211597) \$199
- Sandisk Secure Digital Card 1GB (214386) \$385
- Kodak Secure Digital Card 64MB (208415) \$68
- Kodak Secure Digital Card 128MB (208408) \$125
- Kodak Secure Digital Card 256MB (208409) \$162



### Memory Sticks

- Sandisk Memory Stick 128MB (211600) \$72
- Sandisk Memory Stick 256MB (211601) \$139
- Sandisk Memory Stick Pro 256MB (211602) \$109
- Sandisk Memory Stick Pro 512MB (211603) \$229
- Sandisk Memory Stick Pro 1GB (211604) \$459
- Sandisk Memory Stick Pro 2GB (214388) \$915
- Sony Memory Stick 32MB (SONY83) \$44
- Sony Memory Stick 64MB (SONY84) \$62
- Sony Memory Stick 128MB (191859) \$90
- Sony Memory Stick Pro 256MB (203996) \$153
- Sony Memory Stick Pro 512MB (203999) \$412
- Sony Memory Stick Pro 1GB (204000) \$965



### Smart Media Cards

- Sandisk Smart Media Card 128MB (211589) \$49

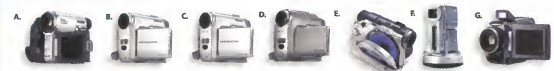


### Canon Video Cameras



Websearch	Product Description	CCD	Zoom (Optical)	Digital Zoom	LCD Colour Screen	Storage	Connection	Weight	Price
A. 223061	Canon MV700i MiniDV	800K	18x	360x	2.5 inch	Tape	IEEE1394	485g	\$749
B. 223060	Canon MV730i MiniDV	800K	20x	400x	2.5 inch	MMC & SD	IEEE1394	485g	\$915
C. 223059	Canon MV750i MiniDV	800K	22x	440x	2.5 inch	MMC & SD	IEEE1394	485g	\$1125
D. 223065	Canon MVX200i	1330K	14x	280x	2.5 inch	MMC & SD	IEEE1394	500g	\$1235
E. 207074	Canon MV6iMC MiniDV	420K	10x	400x	2.0 inch	MMC & SD	USB/IEEE1394	380g	\$1319
F. 223064	Canon MV9250i	1330K	18x	360x	2.5 inch	MMC & SD	IEEE1394	500g	\$1425
G. 210669	Canon MVX10i MiniDV	2000K	10x	200x	2.5 inch	MMC & SD	USB/IEEE1394	450g	\$1925
H. 210670	Canon MVX3i MiniDV	2000K	10x	200x	3.5 inch	MMC & SD	USB/IEEE1394	725g	\$2178

### Sony Video Cameras



Websearch	Product Description	CCD	Zoom (Optical)	Digital Zoom	LCD Colour Screen	Storage	Connection	Weight	Price
A. 214485	Sony DCRHC15 MiniDV	400K	10x	640x	2.5 inch	Tape	USB/IEEE1394	520g	\$754
B. 214507	Sony DCRHC20 MiniDV	400K	10x	120x	2.5 inch	Memory Stick	USB/IEEE1394	380g	\$924
C. 214571	Sony DCRHC30S MiniDV	400K	10x	120x	2.5 inch	Memory Stick	USB/IEEE1394	380g	\$1093
D. 214574	Sony DCRHC40S MiniDV	690K	10x	120x	2.5 inch	Memory Stick	USB/IEEE1394	400g	\$1345
E. 213888	Sony DCRDV100 DVD	400K	10x	120x	2.5 inch	DVD	USB	640g	\$1814
F. 210573	Sony DCRP1 MicroMV	690K	10x	120x	2.5 inch	Memory Stick	USB/IEEE1394	230g	\$2352
G. 195557	Sony DCRP95 MicroMV	690K	10x	120x	2.5 inch	Memory Stick	Bluetooth	435g	\$2534

### Olympus Digital Cameras



Websearch	Product Description	Megapixels	Optical Zoom	Price
A. 223806	Olympus C-160 Digital Camera	3.2	No	\$275
B. 223091	Olympus C-310 Digital Camera	3.2	3x	\$399
C. 223092	Olympus Zoom C-460 Digital Camera	4.2	3x	\$446
D. 197296	Olympus MJ11-300 Digital Camera	3.2	3x	\$536
E. 223095	Olympus MJ11-410 Digital Camera	4	3x	\$715
F. 227027	Olympus Zoom C-60 Digital Camera	6.1	3x	\$535
G. 197290	Olympus Ultra Zoom 740 Digital Camera	3.2	10x	\$635
H. 211993	Olympus Zoom C-5000 Digital Camera	5	3x	\$803
I. 223807	Olympus Ultra Zoom 770 Digital Camera	4	10x	\$999
J. 211771	Olympus Zoom C-5060 Digital Camera	5	4x	\$1499
K. 223094	Olympus Zoom C-8080 Digital Camera	8	5x	

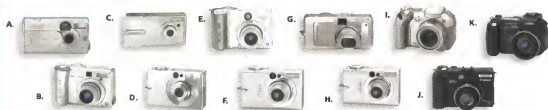
### Fuji Digital Cameras



Websearch	Product Description	Megapixels	Optical Zoom	Price
A. 223809	Fuji FinePix A205S Digital Camera	2	3x	\$199
B. 223810	Fuji FinePix A210 Zoom Digital Camera	3.2	3x	\$285
C. 223811	Fuji FinePix A310 Zoom Digital Camera	3.1	3x	\$375
D. 223812	Fuji FinePix A330 Digital Camera	3.2	3x	\$315
E. 223813	Fuji FinePix A340 Digital Camera	4	3x	\$375
F. 223814	Fuji FinePix S3000Z Digital Camera	3.2	3x	\$399
G. 223815	Fuji FinePix F420Z Digital Camera	3.1	3x	\$539
H. 223817	Fuji FinePix S5000Z Digital Camera	3.1	10x	\$549
I. 223819	Fuji FinePix F700 Digital Camera	6.2	3x	\$735
J. 223816	Fuji FinePix F610Z Digital Camera	6.3	3x	\$815
K. 223818	Fuji FinePix S7000Z Digital Camera	6.3	6x	\$925

**iswh**Hardware  
Software  
Consumables

## Canon Digital Cameras



## Websearch

A. 223063  
B. 222765  
C. 214304  
D. 222441  
E. 210739  
F. 223769  
G.  
H. 222701  
I. 223866  
J. 197557  
K. 223773

## Product Description

Canon PowerShot A310 Digital Camera  
Canon PowerShot A75 Digital Camera  
Canon PowerShot IXUS I Digital Camera  
Canon PowerShot IXUS IIS Digital Camera  
Canon PowerShot A80 Digital Camera  
Canon PowerShot IXUS 430 Digital Camera  
Canon PowerShot 560 Digital Camera  
Canon PowerShot IXUS 500 Digital Camera  
Canon PowerShot 51 IS Digital Camera  
Canon PowerShot G5 Digital Camera  
Canon PowerShot Pro 1 Digital Camera

## Megapixels

3.2  
3.2  
4  
3.2  
4  
4  
5  
5  
3.2  
5  
8

## Optical Zoom

No  
3x  
No  
2x  
3x  
3x  
3.6x  
3x  
10x  
4x  
7x

## Price

\$239  
\$385  
\$429  
\$499  
\$549  
\$675  
\$741  
\$765  
\$785  
\$849  
\$1835

## Kodak Digital Cameras



## Websearch

A. 222763  
B. 224461  
C. 226133  
D. 224169  
E. 214166

## Product Description

Kodak CX7300 Digital Camera  
Kodak CX7300 Digital Camera  
Kodak DX4530 Digital Camera & Dock  
Kodak DX7630 Digital Camera  
Kodak DX6490 Digital Camera

## Megapixels

3.2  
3.1  
5  
6.1  
4

## Optical Zoom

No  
3x  
3x  
3x  
10x

## Price

\$240  
\$344  
\$462  
\$767  
\$899

## Sony Digital Cameras



## Websearch

A. 207228  
B. 195423  
C. 211281  
D. 196333  
E. 196332  
F. 196330  
G. 196858  
H. 196373  
I. 211979  
J. 196327  
K. 211563

## Product Description

Sony DSCU60 Cybershot Digital Camera  
Sony DSCP72 Cybershot Digital Camera  
Sony DSCU50 Cybershot Digital Camera  
Sony DSCP92 Cybershot Digital Camera  
Sony DSCP85 Cybershot Digital Camera  
Sony DSCP10 Cybershot Digital Camera  
Sony DSCFX77 Cybershot Digital Camera  
Sony DSCV1 Cybershot Digital Camera  
Sony DSCV1 Cybershot Digital Camera  
Sony DSCV1 Cybershot Digital Camera  
Sony DSCF717 Cybershot Digital Camera  
Sony DSCF828 Cybershot Digital Camera

## Megapixels

2  
3.2  
2  
5  
3.2  
3.2  
4  
5  
5  
5  
5  
8

## Optical Zoom

No  
No  
No  
3x  
3x  
3x  
No  
4x  
4x  
4x  
5x  
7x

## Price

\$350  
\$418  
\$438  
\$587  
\$588  
\$751  
\$844  
\$849  
\$929  
\$1091  
\$1674

## Nikon Digital Cameras

Websearch	Description	Megapixels	Optical Zoom	Price
A. 223820	Nikon Coolpix 2200 Digital Camera	2	3x	\$287
B. 223808	Nikon Coolpix 3200 Digital Camera	3.2	3x	\$424
C. 213474	Nikon Coolpix 3700 Digital Camera	3.2	3x	\$540
D. 209563	Nikon Coolpix 4300 Digital Camera	4	3x	\$589
E. 209835	Nikon Coolpix 4500 Digital Camera	4	4x	\$925
F. 209836	Nikon Coolpix 5400 Digital Camera	5.1	4x	\$1049
G. 209837	Nikon Coolpix 5700 Digital Camera	5.1	8x	\$1599
H. 223827	Nikon Coolpix 8700 Digital Camera	8	8x	\$1835

## CompactFlash Cards

- Sandisk CompactFlash Card 64MB (211537) \$31
- Sandisk CompactFlash Card 128MB (211538) \$45
- Sandisk CompactFlash Card 256MB (211539) \$79
- Sandisk CompactFlash Card 512MB (211540) \$148
- Sandisk CompactFlash Card 1GB (214223) \$205
- Sandisk CompactFlash Card 2GB (224089) \$565
- Kodak CompactFlash Card 64MB (208410) \$55
- Kodak CompactFlash Card 128MB (208413) \$73
- Kodak CompactFlash Card 256MB (208411) \$144



## xD Picture Cards

- Sandisk xD Picture Card 64MB (214382) \$33
- Sandisk xD Picture Card 128MB (224427) \$70
- Sandisk xD Picture Card 256MB (214384) \$149
- Sandisk xD Picture Card 512MB (214030) \$260
- Olympus xD Picture Card 32MB (209275) \$31
- Olympus xD Picture Card 64MB (208020) \$52
- Olympus xD Picture Card 128MB (224410) \$95
- Olympus xD Picture Card 256MB (197508) \$175
- Olympus xD Picture Card 512MB (209984) \$315



## MultiMedia Picture Cards

- Sandisk MultiMedia Picture Card 64MB (226126) \$40
- Sandisk MultiMedia Picture Card 128MB (211592) \$65





## LiteOn Internal 52/32/52 CDRW Kit

The LiteOn CDRW Drive includes SmartBurn technology that automatically checks media quality and sets limit on burning speed to ensure successful writing sessions. The IDE drive can be installed either vertically or horizontally, has buffer overrun prevention and also a vibration absorber mechanism.



**\$52**

Websearch Code ..... 211218

## LiteOn Internal Combo Drive

This drive offers the best of both worlds. Not only does this drive offer 48x/24x/48x burn speeds for CD's, it allows the user to play DVD's. With innovative SMART-X technology that supports high speed digital audio extraction and high speed VCD data extraction, this drive is not only error free but fast.



**\$77**

Websearch Code ..... 208431

## LiteOn 16x DVD-ROM Drive

- 16x DVD-ROM & 48x CD-ROM with Pure-CAV technology
- SMART-X technology supports high speed digital audio and VCD extraction
- High speed DVD/CD playback technology to improve playability
- Easy-try design for both horizontally & vertically use
- Gear-driven tray loading mechanism to improve reliability



**\$49**

Websearch Code ..... 189355

## LaCie DVD±R/RW8x + Dual Layer DVD±R2.4x

### Double Layer Technology

Store nearly twice as much data as current DVD media - 8.5GB on a single-sided DVD disc. Save up to 16 hours of VHS video, 4 hours of high-quality MPEG-2 DVD video or up to 8.5GB of data, audio or images. Large-capacity, double layer DVD media (DVD±R2) is also ideal for backing up computer systems or archiving MP3 libraries on a single disc.

### DVD±R in One Drive

This universal drive delivers four DVD formats in a single, slim device. This combination drive is also capable of writing to CD and DVD formats, which are compatible with nearly all existing DVD-Video players.

### Record Custom DVDs in Minutes

Offering the fastest DVD record speed on the market, the LaCie d2 DVD±R Double Layer Drive features 8x record speeds in DVD-R and DVD+R formats. This all-in-one rewritable drive also features FireWire and Hi-Speed USB 2.0 ports for easy connection to any Mac or PC.

FireWire/USB	<b>\$376</b>	Internal	<b>\$235</b>
Websearch WIN/MAC ..... 225555		Websearch WIN ..... 225498	



## LaCie d2 External Hard Disks

LaCie d2 range is a professional flexible system. Made of extruded aluminum and Zamac alloy, which are the same materials used in Formula 1 cars design for their unique features: robust, lightweight and fast cooling. Kensington cable lock and power lock for better security. Front power button and blue activity led, switches on/off with your computer. Supplied with drivers for Mac and PC. Drives can be used stacked horizontally or can be mounted in a 1U 19" rack (kit sold separately). All d2 external hard disks are 7200rpm.

- 160GB USB2.0 & FireWire & F800 (223032) **\$359**
- 200GB USB2.0 & FireWire & F800 (193899) **\$434**
- 250GB USB2.0 & FireWire & F800 (221842) **\$505**
- 400GB BD USB2.0 & FireWire & F800 (221896) **\$845**
- 500GB BD USB2.0 & FireWire & F800 (196238) **\$899**
- 1000GB USB2.0 & FireWire & F800 (214528) **\$1770**

\*F800 is a new FireWire interface doubling transfer rate up to 100MB/s of current FireWire interface. Requires specific F800 card to take advantage of the performance.

## LaCie PCMCIA & PCI Cards

Choose between LaCie FireWire PC & PCI Cards and USB 2.0 PCI Cards for your PC. Quickly and easily introduce FireWire 800, FireWire 400 or USB 2.0 to your computer to connect additional peripherals to your system.

### PCMCIA Cards

- FireWire/FireWire800/Link PCMCIA Card (246512) **\$124**

- USB2.0 & FireWire PCMCIA Card (246513) **\$87**

### PCI Cards

- FireWire 800 PCI Card (202183) **\$122**

- FireWire PCI Card (202182) **\$33**

- USB 2.0 & FireWire PCI Card (207048) **\$85**

- USB 2.0 PCI Card (202181) **\$37**



## LaCie Multi Card Reader

- Supports eight types of media
- Plug and play convenience
- Compact design with versatile USB connectivity
- An essential tool for digital photographers and marketing departments.
- Simple setup and convenient USB interface make it ideal for viewing images on a variety of digital media in both Mac and PC environments.
- Win/Mac



Websearch Code ..... 225250	<b>\$37</b>	Websearch Code ..... 193903	<b>\$65</b>
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## LaCie Floppy Disk Drive

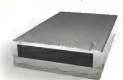
- Offers an ultra-thin, portable design to provide complete mobility, allowing you to move freely and take your data with you wherever you go
- Simple setup without terminators or device IDs
- Ideal for additional storage, archiving, data shuttle, and cross-platform data exchange
- Win/Mac



## LaCie USB DVD±RW

"design by F.A.Porsche"

Conveniently compatible with DVD±R/RW and DVD±R/RW media, the LaCie DVD±RW Drive lets you choose the DVD format you'd like to use for your personal projects. Create personal DVD videos, share family photos, store thousands of MP3s and back up as much as 4.7GB of important information.



Websearch Code ..... 246556	<b>\$282</b>
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## LaCie Drive USB2

"design by F.A.Porsche"

State-of-the-art design and awesome performance, with room for the disk up to 250GB. Built to be lightweight and durable, these drives can be easily moved for sharing and exchanging of files.

- 80GB 7200rpm USB2.0 (213173) **\$220**
- 160GB 7200rpm USB2.0 (213909) **\$299**



Websearch Code ..... 213915	<b>\$399</b>
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## LaCie Mobile drive USB2

"design by F.A.Porsche"

Specially designed for getting your files from point A to point B. Made with a durable exterior to withstand life on the go, this portable drive lets you safely travel with up to 80GB of personal information, including MP3s, audio tracks and photos.

- Mobile 40GB USB2.0 (213902) **\$317**
- Mobile 60GB USB2.0 (226049) **\$411**
- Firewire Available



Websearch Code ..... 213903	<b>\$554</b>
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## LaCie Data Watch

With the stylish LaCie Data Watch, you can safely transport up to 128MB of data on your wrist. Compatible with Mac and Windows operating systems, this watch is easily connected to Mac or PC computers via the convenient USB 2.0 interface.

- 256MB (246570) **\$224**



Websearch Code ..... 240580	<b>\$124</b>
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**iswh**

Hardware  
Software  
Consumables

Storage

## Pioneer A07XL 8xDVD-R, 8xDVD+R, DVD-R/+R 8x, DVD-RW/+RW 4x

Pioneer's dual format DVD/CD internal writer records DVD-R /+R discs up to 8x, DVD-RW /+RW disc up to 4x speed and CD-R / CD-RW discs up to 24x speed. RAM discs can also be read.

It's super-fast. It's quiet. And it's very, very smart. The unique honeycomb chassis reduces vibration and noise, while performance-adjusting firmware lets you shift between maximum performance and quiet operation at will.

### Precision Recording Technology

Pioneer's exclusive performance enhancing features ensure high quality recording characteristics and low operational noise. Write strategy control circuitry positioned in close proximity to the writing laser limits signal delay, allowing high quality recording at high speed.

### Ultra Dynamic Resonance Absorber

Absorbs vibration caused from imbalanced media. Stabilises media for higher quality writing and for quieter read performance even at high speed.

### Bundled Software

- Ulead DVD MovieFactory 3 SE Suite
- Ulead Video Studio 7 SE
- Ulead DVD Picture Show SE
- DVD-lab
- TMPGEnc MPEG1/2 + DOLBY AC-3 Audio Encoder

### Features:

- Unique new beige design front
- Honeycomb chassis for super-quiet & smooth operation
- Performance Adjusting Firmware
- Quality Ulead software
- Dolby AC-3 audio encoder
- Media included (1 x 8X DVD-R, 1 x 4X DVD-RW)
- DVD-R, DVD-RW, DVD+R, DVD+RW, CD-R, CD-RW
- DVD-R 8x, DVD-RW 4x
- DVD+R 8x, DVD+RW 4x
- CD-R 24x, CD-RW 24x

**NOW  
Writes 8x Speed  
DVDs**



OEM  
Websearch Code ..... 214023

**\$159**

Beige DVR-A07XLA  
Websearch Code ..... 214696

**\$185**

## Maxtor OneTouch Personal Storage

It's not just data, it's your life. Save it. Store it. Back it up with the push of a button.

Just press the button and your files are backed up in one simple step. It's simply the faster backup. Faster than CD. Faster than a floppy. Faster than removable cartridge systems. Need storage? We're talking huge amounts—up to 300GB. Space for your photos, videos, graphics, music, documents and more. Spend less time searching for files by storing them on a single, spacious drive.

The drive, with its high quality, anodized aluminum case, is as attractive as it is flexible. It's great for home or office. It lies flat on your desk or stands upright to save space. It connects to FireWire or USB ports on a PC or Mac. It backs up with the Maxtor

OneTouch button or runs automated backups using the included software, Dantz Retrospect Express. And you can customize the button to launch any application.

### 120GB - Perfect for home or office

The Maxtor Personal Storage external hard drive quickly adds storage and organisational space through your computer's USB port.

### 200/250GB - Perfect for video editing and high-end graphics

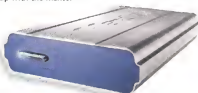
The Maxtor 7200RPM hard drive featuring both FireWire (IEEE1394, iLINK) and USB 2.0 interface ports for your PC and Mac.

### 300GB - Perfect for storage hungry files

The Maxtor 300GB hard drive provides you with enough capacity to hold and organise your storage-hungry applications and files.

### Features

- Patent-pending Maxtor OneTouch technology
- Plug and play storage
- Hot-swappable
- Anodized aluminum design
- Stands vertically or horizontally
- Customisable Maxtor OneTouch button
- Power management and on/off switch
- Whisper-quiet FDB motor
- Mac formatted (for Mac)
- Connect additional drives



80GB  
Websearch Code ..... 225097

**\$249**

120GB  
Websearch Code ..... 211128

**\$289**

160GB  
Websearch Code ..... 246481

**\$347**

200GB  
Websearch Code ..... 211129

**\$415**

250GB  
Websearch Code ..... 211130

**\$445**

300GB  
Websearch Code ..... 211145

**\$499**

## Sony Internal Dual-Layer DVD Burner

### Key features

- Supports Dual Layer Media
- BX Max + & - DVD Recording
- 40X Max CD Recording
- 24X Max CD ReWriting
- 12X Max DVD Playback
- 40X Max CD Playback
- External (224512) \$438



**\$261**

Websearch Code ..... 224338

## Sony Internal 52/32/52X CD-RW Kit

Features 52X recording and playback. Incorporates new Ultra-Speed Rewriting support, buffer under-run protection and a unique dual speed operation. Designed for Desktop or Tower PC, comes with an interface cable and mounting screws.

- Sony Internal 52x32x52x with Roxio CD Creator 5 OEM software (210991) **\$62**
- Sony Internal 52x32x52x with Nero 5 OEM software (210990) **\$66**



**\$56**

Websearch Code ..... 210390

## Sony Internal IDE 52/32/52/16X Combo Kit

This kit includes a combined CD Burner/ Rewriter and CD/ DVD Player. The drive features buffer under-run protection, fast Audio Extraction and a unique Dual Speed operation. At 48X Max it will record a CD in around 2 1/2 minutes.



**\$98**

Websearch Code ..... 214392

**www.iswh.com.au**

click here to buy...

21

AUGUST/SEPTEMBER 2004

# Peripherals & Storage Devices

## Computer Products at Rock Bottom Prices

### Seagate Barracuda Hard Drives

- 7200 RPM desktop performance
- 350 Gb nonoperating shock. Protect drive from shock and vibration
- DiscWizard software
- SoftSonic FDB Motor
- 2-Mbyte cache buffer
- 120GB (19A590) \$149
- 160GB (20B071) \$175



**\$119**

Websearch Code ..... 19652

### Maxtor Hard Drives ATA-133 7200RPM 8mb Cache

The solution for performance PCs with data intensive applications such as network attached storage, home networking devices, audio, video and other multimedia applications.

- 120GB (211201) \$149
- 160GB (211202) \$175
- 200GB (211199) \$248



**\$119**

Websearch Code ..... 21120

### Century CD Storage

Century CD is the industry's first affordable, intelligent CD and DVD storage unit, providing the user with a 100 disk capacity per unit. Manages up to 127,000 disks from a single interface on your PC.

**CD & DVD Storage Unit**



**\$79**

Websearch Code ..... 224321

### Kensington USB Phone Charger

- Retractable USB Mobile phone charger with Car adapter
- Compatible with Nokia, Motorola, Siemens and Ericsson
- Small, smart and easy to carry
- Now there is no need to carry that heavy AC adapter while travelling
- Works with any USB port on Laptop, Desktop or Mac
- Easy to use - USB plug and play
- 2 year warranty



**\$39**

Websearch Code ..... 223135

### Kensington Pocket Hub USB 2.0

- USB 2.0 technology up to 40 times faster than USB 1.1.
- Four USB ports handle up to four devices simultaneously.
- Perfect for travel: compact, slim, lightweight.
- Plug and play: ready to go, anytime and anywhere.
- Power adapter ensures full power to any peripheral
- 7 Port USB 2.0 Hub (223138) \$75



**\$47**

Websearch Code ..... 223141

### Kensington Wi Fi Finder

- Detects most available WiFi networks with the press of a button
- Three lights indicate signal strength
- Compact and lightweight
- Detects open hotspots from up to 200 feet
- Filters out other wireless signals, including cordless phones, microwave ovens and Bluetooth networks.
- No software or computer required.



**\$31**

Websearch Code ..... 223147

### Kensington Portable Memory Card Reader

- USB 2.0 technology up to 40 times faster than USB 1.1
- Six card formats: MultiMediaCard, CompactFlash, Memory Stick, Microdrive, Secure Digital, SmartMedia.
- No need to switch out your digital camera or other data device; just insert the memory card for super fast upload.



**\$68**

Websearch Code ..... 223145

### Kensington Universal AC/Car/Air Adapter

- Unique adapter combination handles standard wall outlet power (AC), car plug (DC), air connection cord (DC) and notebook cord
- Notebook input cord includes 10 interchangeable tips. Compatible with all major notebook makers, including Apple, Compaq, Dell, Fujitsu, HP, Toshiba, IBM, Sony, Gateway and other Pentium 4 and Centrino notebooks
- Over voltage protection, current limit, over temperature protection, short circuit protection
- Comes with a carry case



**\$175**

Websearch Code ..... 223137

### Kensington Portable Universal Docking Station

- High-Speed USB 2.0 is up to 40 times faster than standard USB 1.1
- Instantly converts your notebook into a desktop workstation
- Plug-and-play functionality: one simple USB interface connects you instantly to your keyboard, mouse, printer, network and many other USB devices.



**\$137**

Websearch Code ..... 223146

### SanDisk Cruzer Mini

Cruzer Mini is an ultra-small, ultra-thin USB 2.0 Hi-Speed flash drive that will have you and your data on the move in no time at all. In fact, the portable Cruzer Mini is the fastest and easiest way to store and move your documents, pictures, presentations and music files between home, work, school - or any other place you need to go. No drivers needed - just plug and go! Cruzer Mini plugs into any USB 2.0 port and is backwards compatible with USB 1.1. It's truly "plug and play" with both PCs and the Macintosh due to USB Mass Storage Class (MSC) compliance when used with Windows ME, Windows 2000, Windows XP, Mac OS 9.2.1+ and Mac OS 10.1.2+.



128MB **\$66**

Websearch Code ..... 214564

256MB **\$99**

Websearch Code ..... 213845

512MB **\$185**

Websearch Code ..... 214670

### Belkin USB2 Storage Device

Simply plug the Flash Drive into any USB port and it will be recognised as a removable drive. Each drive allows you to store data, copy, delete or move files between any notebook or desktop PC with ease.

- 256MB (223661) \$189
- 512MB (223662) \$389



**\$110**

Websearch Code ..... 223660

### Iomega Mini USB Drive

Comes complete with password software so only the user can access any of the important data that you may store on the drive. Being USB it requires no power or batteries.

- 256MB (214130) \$139
- 512MB (214131) \$242



**\$95**

Websearch Code ..... 214132

### Sandisk Cruzer Micro

Sandisk Cruzer Micro is a small USB Flash Drive that connects to a computer's USB port. With capacities ranging from 128MB to 512MB, users can easily store their key documents, pictures, music and videoclips on a Cruzer Micro and transfer them to another computer with a USB port.

- 256MB (225177) \$105
- 512MB (225192) \$199



128MB **\$72**

Websearch Code ..... 225178

### Sony Micro Vault USB 2.0 Storage Device

Simply plug directly into your computer's USB port, then transfer files as required. The drives feature a storage capacity of 128MB along with Password lock, AutoZip, PC Lock & Auto Login software.

- 256MB (222512) \$169
- 512MB (222513) \$295



**\$101**

Websearch Code ..... 222511

## Belkin SurgeMaster

A power surge or lightning strike can destroy your electronic equipment in an instant. The SurgeMaster range offers the best protection for all your sensitive electronic devices in your home or office. No amount of thunder and lightning will ever be able to scare away your protection. Be safe and smart; choose a SurgeMaster with telephone/data line protection and if you want to protect your AV equipment with coaxial connection, choose the surge protector that protects both.

Websearch	Product Description	Price
223718	Belkin Home Series Surge Cube	\$27
223719	Belkin Home Series Surge Cube with Tel	\$35
223721	Belkin Home Series 4-Way (2m Cord)	\$49
223722	Belkin Home Series 4-Way (2m Cord) plus AV	\$66
223750	Belkin Superior Series 6-Way (2m Cord) plus Tel	\$99
223751	Belkin Superior Series 6-Way (2m Cord) plus Tel plus AV	\$115
223753	Belkin Gold Series 7-Way (3m Cord) plus Tel plus AV plus RJ45	\$149
223755	Belkin Gold Series 8-Way (2m Cord) plus Tel	\$129
223756	Belkin Gold Series 8-Way (2m Cord) plus Tel plus AV	\$145

## Belkin Mini-Wireless Optical Mouse

Perfect for the mobile professional. Take it on the road and use its optical precision on virtually any surface - anywhere you use your laptop. Works on your notebook computer from as far as 3-feet away.



**\$59**

Websearch Code 196099

## Belkin Wireless Keyboard & Optical Mouse

Uses digital radio technology to give you the luxury of using your keyboard and mouse anywhere within six feet of the receiver. No more cables to clutter your desktop. The mouse uses optical technology to deliver accurate signals from smooth, easy movements. Access the Internet and favorite applications using the seven multimedia keys and seven hot keys.

Belkin Classic keyboard and mouse (208863) \$44



**\$55**

Websearch Code 208862

## Belkin Hi-Speed USB 2.0 7-Port Hub

Belkin's Hi-Speed USB 2.0 7-Port Hub features two, top-loading downstream USB ports. Now you can enjoy fast access for temporary device connections such as USB thumb drives, media readers and for USB lights, fans and other accessories. Monitoring your device activity is simpler than ever with LEDs for master power status and all port activity.



**\$72**

Websearch Code 222053

## Belkin Universal 800VA UPS

The 800VA offers protection for your computer against surges, spikes, blackouts and lightning strikes. It features serial and USB Ports, 4 battery backup sockets with surge protection, a \$150,000 connected equipment and data recovery warranty. When the power goes off the computer stays on! Also available in 1000va & 1200va models.



**\$465**

Websearch Code 221844

## Belkin CoPilot Live PocketPC Edition

Connects wirelessly to your Pocket PC using the power of Bluetooth

Drive with confidence! Travelling by road can be frustrating for anyone, with things like detours, delays, and losing your direction only makes things worse. Belkin CoPilot Live will handle those distractions so you can concentrate on what's important to you. It's the personal GPS navigation solution you can take anywhere.

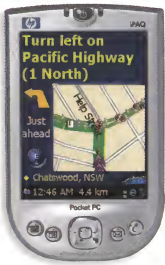
Enter up to 50 different locations Quickly and easily enter your journey and follow Belkin CoPilot's turn-by-turn spoken instructions.

Maintain peace of mind Even if you miss a turn, hit traffic or encounter roadworks, you have nothing to worry about.

Always stay on track Within seconds Belkin CoPilot will automatically re-route you. You'll still get spoken directions all the way to your destination.

- Kit also includes:
- Secure Digital Memory Card Pre-Loaded with Australian maps
  - In-Vehicle Power Adapter for BT GPS and your Pocket PC
  - Vent Mount
  - Quickstart Guide
  - Software CD with Desktop Planner
  - Winchart Marine Navigation Software

Belkin CoPilot Notebook Edition USB version (246706) \$815



Belkin CoPilot Live on-screen display (PocketPC not included)



Bluetooth

**\$998**

Websearch Code 246705

## APC Back-UPS ES 350/500 VA USB

Provides continued uptime and hardware protection for home or office users. Contains five Australian style outlets, phone, modem, fax and DSL data line surge protection, computer interface port for USB communications.

• 500 VA USB (212787) \$220



350 VA USB

**\$179**

Websearch Code 189734

## APC Back-Ups RS 800 VA

Lightning and surge protection Internet Fax/Modem/DSL surge protection

Reservable circuit breaker

Building wiring fault indicator

APC Back-Ups RS 1000va (207121) \$619

APC Back-Ups RS 1500va (207122) \$821

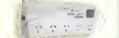


**\$563**

Websearch Code 212832

## APC Surge Arrest Personal W/PH Protection

- Phone line protection
- 315 Joules Surge Energy Capacity
- Child-safe outlets
- Protection Working Indicator - warns user if its circuitry is damaged
- No line protection (195420) \$45



**\$59**

Websearch Code APC037

## APC Surge Protection for Notebooks

Offers compact APC, phone, modem line surge protection for the mobile professional.

• 2 Prong (197379) \$49



3 Prong

**\$49**

Websearch Code 197380

## Belkin Complete Mobility Bundle

Belkin's Complete Mobility Bundle is designed to meet the needs of all mobile professionals. It represents a necessary addition to any notebook solution and includes a stylish notebook case, a USB 4 Port Mini Thumb Hub and a MiniScroller Optical Mouse all in the one pack at a value price.



Great Value!

**\$77**

Websearch Code 246704

### S-Media USB 128MB watch

The S-Media USB watch offers you the flexibility of always having storage with you. When was the last time you needed a floppy disc, a usb drive or a cd to copy something, now you can always be prepared with 128mb of storage.


**\$109**

Websearch Code ..... 212692

### Belkin Bluetooth Hands-Free Headset

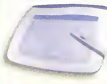
Designed to provide the comfort of hands-free communication easily, the Belkin Headset lets you activate calls with the answerline button on your earpiece, and works from up to 30 feet from your phone.


**\$139**

Websearch Code ..... 227043

### Graphix Studio Designer 9x6

With a 9" x 6" working area, 1024 levels of pressure sensitivity and effective tablet control panel for fine tuning. This tablet snatched a best buy award from PC User Magazine (March 2002) and is setting itself up to be an indispensable tool for anyone wanting more out of their PC.


**\$259**

Websearch Code ..... 195248

### Wacom Graphire3

The Graphire3 refines the concept of working with graphics and drawing, signing documents and photovideo editing applications. It is designed for the entry level user but is also ideal for the digital photographer, budding videographer and computer graphics enthusiast.

The Graphire3 comes with Wacom's renowned pressure-sensitive pen technology with 512 levels of pressure sensitivity and 2032 Lines Per Inch resolution. Cordless and batteryless in nature makes you carefree at work! The pressure sensitive eraser allows you to 'rub out' in drawing/painting, as well as delete text in applications such as Microsoft Word and Excel.

• 4x5 tablet available in Pink, Silver or Metallic Blue

#### Included Software

- Ulead Photo Express SE V4
- Procreate Painter Classic
- PenPlus Personal
- Win/Mac



4x5 Silver

Websearch Code ..... 209840

**\$115**

6x8

Websearch Code ..... 209748

**\$215**

### Wacom Intuos2

The Intuos2 professional graphics tablet is the latest step forward in the evolution of state-of-the-art input devices for graphics professionals and digital photographers. Wacom's Intuos2 Grip Pen features 1024 levels of tip and eraser pressure, tilt, angle and direction, and two side buttons that act as modifier keys, keystrokes, or mouse buttons. As with all Intuos2 tools, the pen's functionality is completely customizable through Wacom's Control Panel software. The 9x12, 12x12 and 12x18 sizes feature dual track where you can use two accessories on the tablet at the same time and quick point areas for fast navigation. Intuos2 tablets come in a variety of colors.

#### • Win/Mac

#### Included Software

- Painter Classic
- Adobe Photoshop Elements 2. (for 4x5, 6x8 and 9x12 sizes)
- Comic Studio mini
- 6x8 (no software) (212007) \$358
- 9x12 Ice Blue (214040) \$641
- 9x12 (no software) (213079) \$525



4x5 Ice Blue

Websearch Code ..... 189779

**\$292**

6x8 Ice Blue

Websearch Code ..... 199516

**\$415**

### Iomega Zip Drives 100MB & 250MB

Reliable, versatile and cost-effective. You can choose from 100MB and 250MB configurations to protect and secure your important data.

- 100MB USB (IOM151) \$113
- 250MB Internal Atapi (208406) \$135



250MB USB

Websearch Code ..... 201146

**\$190**

750MB USB2

Websearch Code ..... 213519

**\$272**

### Iomega Zip media

Iomega Zip media was a storage breakthrough when it was introduced in 1995. With large capacities of 100MB, 250MB and 750MB, Zip disks allow you to back up, transfer, secure and archive all of your critical data - all while being portable and password protected.

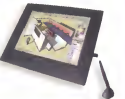


Websearch	Product Description	Quantity	Price
214157	Iomega Zip 100MB Disk	1 Pack Win/Mac	\$17
214158	Iomega Zip 100MB Disks	10 Pack Win/Mac	\$149
214159	Iomega Zip 250MB Disk	1 Pack Win/Mac	\$20
214160	Iomega Zip 250MB Disks	2 Pack Win/Mac	\$38
214161	Iomega Zip 250MB Disks	10 Pack Win/Mac	\$159
209183	Iomega Zip 750MB Disk	2 Pack Win/Mac	\$49
207603	Iomega Zip 750MB Disks Grey	10 Pack Win/Mac	\$187

### Wacom Cintiq 15x

The Cintiq 15x is a versatile tool for enhancing creative content, maximizing productivity, and communicating ideas in a natural and comfortable way. It features a compact design, clear LCD display, direct pen-on-screen control, wide viewing angle and adjustable stand.

#### • Win/Mac


**\$3449**

Websearch Code ..... 214038

### Wacom Cintiq 18SX

The Cintiq 18SX is an 18 inch Large Format SXGA Interactive Pen Display, equipped with the highest standard TFT LCD panel. Having an easy fitting rubber grip and a fast response rate, Cintiq's pressure-sensitive Grip Pen will give you exact control and smoothness to your creative work. The original rotational feature and inclination display stand, enables everybody to work their own natural way or style.

#### • Win/Mac


**\$6299**

Websearch Code ..... 214039

### Iomega Hard Drives

Iomega hard drives are compact and rugged with hot plug & play capability. They deliver high capacity, flexibility and performance for today's data-intensive applications and digital video/audio files. Iomega hard drives come with Iomega Automatic Backup and Symantec Norton Ghost 2003 Disaster Recovery software to protect your files and are Mac & PC compatible to make switching easy.

- 120GB USB2/Firewire (207786) \$329
- 250GB USB/Firewire (211846) \$539



80 MB External USB2

Websearch Code ..... 207923

**\$249**

### Iomega CD-RW USB2 52x32x52x

High speed external USB 2.0 CD-RW drive. Speed: 52x write, 32x re-write, 52x read (USB 1.1); 4x write, 4x re-write, 6x read (USB 1.1). Includes buffer under-run protection and Iomega HotBurn CD creation software for CD creation in less than four minutes.

#### • Win/Mac


**\$162**

Websearch Code ..... 223445



## Pinnacle Studio 9

Pinnacle Studio version 9 easily allows home editors the convenience of creating spectacular videos using numerous professional quality features with integrated CD/DVD burning capabilities. Pinnacle Studio 9 provides image stabilisation, automated editing, automatic colour correction, noise removal, and surround sound, while maintaining total ease of use from start to finish.

- Upgrade (214227) \$119
- Academic (214233) \$145



**\$225**

Websearch Code 214226

## Pinnacle Studio 9 DV

Pinnacle Studio DV comes with a FireWire board that allows you to transfer videos from DV camcorder into your PC in order to create spectacular movies using powerful and creative functionalities such as image stabilisation, automated editing, automatic colour correction, noise removal and surround sound, while maintaining total ease of use from start to finish.

- Academic (214234) \$195



**\$335**

Websearch Code 214229

## Pinnacle Studio AV/DV 9

Pinnacle Studio AV/DV comes with an internal PCI board that allows you to transfer videos from any camcorder into your PC in order to create spectacular movies using powerful and creative functionalities such as image stabilisation, automated editing, automatic colour correction, noise removal and surround sound, while maintaining total ease of use from start to finish.

- Academic (214236) \$325



**\$435**

Websearch Code 214230

## Pinnacle Studio AV/DV Deluxe 9

The top-of-class solution inside the Studio line. The included break-out box allows easy and convenient desktop connection to any analogue and digital video sources, in order to capture, edit and export your videos. You can create spectacular movies, using powerful and creative functionalities and the richest collection of filters and effects.

- Academic (214235) \$445



**\$575**

Websearch Code 214229

## Pinnacle Liquid Edition Pro 5.5

Pinnacle Liquid Edition PRO features the power of Liquid Edition as the editing application and an AGP Accelerator card with an analogue & DV I/O breakout box that connect to your DV or analogue camcorder, DV deck or VCR. Full real-time directly on your output monitor.

- Upgrade (211726) \$1379



**\$1856**

Websearch Code 211725

## Pinnacle Liquid Edition AV/DV

Pinnacle Liquid Edition AV/DV 5.5, the powerful and feature-rich Liquid Edition editing software plus Pinnacle's MovieBox DV external AV/DV I/O box. You still get all the real-time features of Liquid Edition 5.5 at an UNBEATABLE PRICE!



**\$830**

Websearch Code 240574

## Hauppauge DEC2000T

The DEC2000T is a standard definition digital TV set top box with a difference - it has a USB port allowing capture of your favourite Digital TV programs to hard drive. You can use the DEC2000T stand-alone with your television set or attach a desktop or laptop PC via USB for live viewing, recording and playback.



**\$359**

Websearch Code 222367

## Hauppauge Nova T

The Nova T is a standard definition (future HD upgradeable) Digital TV PCI tuner card. The Nova T offers the most incredible picture quality available on a PC tuner card. Digital TV programs can be viewed live, pause/timeshifted or recorded to hard drive in their full digital quality without any loss. These can then be archived to DVD.



**\$240**

Websearch Code 211250

## Hauppauge MediaMVP

Listen to and watch digital music, pictures and videos on your TV set, from your PC over your home Ethernet LAN! On-screen menus allow you to browse your PC from the comfort of your TV and allows your PC/PVR system to be located anywhere in your home.



**\$253**

Websearch Code 211251

## Hauppauge TV Tuner Cards

Bringing TV and broadcast data to your PC



Websearch	Product Description	Interface	Audio	FM Radio	HW MPEG Recorder	Remote Control	S-Video In	Video In	Audio In	Price
A. 195954	WinTV-PVR-350	PCI	DBX Stereo	Yes	Up to 12MBits/sec	Yes	Yes	Yes	Yes	\$480
B. 195313	WinTV-PVR-350	PCI	DBX Stereo	Yes	Up to 12MBits/sec	Yes	Yes	Yes	Yes	\$385
C. HA0004	WinTV-USB	USB	Mono	Yes	Up to 12MBits/sec	Yes	Yes	Yes	Yes	\$209
D. 211242	PVR-USB2	USB2	Stereo	Yes	Up to 12MBits/sec	Yes	Yes	Yes	Yes	\$499

## Pinnacle PCTV & PCTV PRO

Fully featured TV Tuner PCI cards to watch TV on a PC in ultimate image quality.

- Watch TV and listen to stereo radio (Pro Version) on your PC even while using other applications.
- Capture in MPEG1 or MPEG2 and burn VCDs, SVCDs or DVDs with your CD or DVD burner
- Remote control
- PCTV (LAK129) \$88



**\$219**

Websearch Code LAK130

## Adaptec VideoOh! DVD

Adaptec Video Converter DVD USB-Device Kit provides the easy way to convert analog camcorder movies digitally then create easy-to-share, long-lasting DVD or Video CD discs with your home computer. VideoOh! DVD includes an external USB 2.0 MPEG-2 capture/encoder box with USB & A/V cables for simple connectivity to camcorders or other analog video device.

- VideoOh! DVD PCI (197006) \$189



**\$225**

Websearch Code 197009

## Adaptec VideoOh! DVD Media Center

Adaptec VideoOh! DVD Media Center is a complete hardware and software solution, which includes a PAL TV tuner, MPEG-2 hardware encoder, free access to an online programming guide, as well as software for personal video recording and full-resolution DVD or video-CD creation.

- VideoOh! DVD Media Center PCI (209179) \$249



**\$278**

Websearch Code 209344



### Canopus Let's EDIT

Canopus Let's EDIT is fast and easy-to-use video editing software with movie-style effects. Breakthrough real-time operation dramatically speeds up the editing process, as there is no rendering or waiting while creating movies with sophisticated special effects.



Let's EDIT

**\$245**

Websearch Code.....212664

### Canopus Let's EDIT RT & RT+

Let's EDIT RT and Let's EDIT RT+ are the world's only OHCI analog and DV editing cards that are completely compatible with all widely used video equipment and hundreds of video editing applications. Together with Let's EDIT software these cards provide real-time render-free video output to ensure that there is no waiting or rendering required to playback, output and complete sophisticated video projects.

- Connects to all widely used analog and DV cameras and decks, including VHS, S-VHS, Hi8, Digital8, DV and DVCAM
- Provides DV and analog video compatibility for leading editing and DVD authoring applications.
- Provides the industry's highest-quality analog-to-DV conversion with locked audio support for perfect audio and video synchronisation
- Let's EDIT RT+ provides video output to a monitor or television while editing
- MacWin



Let's EDIT RT

**\$585**

Websearch Code.....712667

Let's EDIT RT+

**\$779**

Websearch Code.....212664

### Microsoft Notebook Optical Mouse

Microsoft Notebook Optical mouse features Microsoft Optical Technology for smooth, accurate performance. Contoured for comfort and scaled-down in size, Notebook Optical Mouse is always good to go; where ever and when ever you need it. PS2/USB. Win/Mac

**\$46**

Websearch Code.....192444

### Microsoft Wireless Optical Desktop 2

Reliable Microsoft optical technology in a great value wireless mouse and keyboard. Keyboard features a Multimedia Centre to easily navigate music, pictures and videos and instantly access popular functions. The precise mouse is comfortably designed for both right and left hand. USB/PS2 Interface, Win/Mac compatible.

**\$97**

Websearch Code.....210983

### Logitech MX700 Cordless Optical Mouse

MX Optical Engine delivers more accuracy and control on more surfaces than ever before. Fast RT cordless technology delivers corded quality on a cordless device in a six foot range. Rapid charge base station ensures that your mouse is always ready. PS2/USB Win/Mac.

**\$99**

Websearch Code.....193814

MX300

**\$129**

Websearch Code.....211022

### Logitech Cordless Access Duo Optical

Logitech Cordless Access Duo Optical features a comfortable, ultra-flat keyboard and a gently curved optical mouse, making it an excellent choice for home and office users. Advanced digital radio technology lets you work securely anywhere within six feet of your computer.

**\$86**

Websearch Code.....206820

### Microsoft Wireless Optical Mouse

Combines precise Microsoft optical tracking with revolutionary new tilt wheel technology, which enables side to side, as well as up and down scrolling. Your wireless freedom is made even more convenient with new longer battery life, providing many uses with more than 6 months battery life. PS2/USB. Win/Mac.



Steel

**\$64**

Websearch Code.....210977

Blue Moon

**\$56**

Websearch Code.....210978

### Microsoft MultiMedia Keyboard

One-touch buttons take you directly to your favorite multimedia activities - navigate music and video clips, surf the Web, and start the programs you use most. In a sleek black finish and with easy-to-use keys, the Microsoft MultiMedia Keyboard adds dynamic features and stylish looks to any desktop.



Multimedia

**\$37**

Websearch Code.....224266

Multimedia Natural

**\$76**

Websearch Code.....210976

### Logitech MOMO Racing Wheel & Pedals

Designed by the racing professionals at MOMO, the full rubber wheel, stick shifter and racing pedals feel just like the real thing. Features advanced force feedback technology.

• Freedom 2.4 Joystick (202530) \$94

**\$157**

Websearch Code.....222575

### Logitech Cordless MX Duo

Combining the cordless Elite keyboard and the MX-700 mouse, this combination provides all your needs for a clutter free desktop. Win/Mac

**\$142**

Websearch Code.....222530

### Microsoft Basic Optical Mouse

Microsoft Optical Mouse Technology replaces the old-fashioned mouse ball and works on virtually any surface. Easy and comfortable to use, Basic Optical Mouse is the choice for value. USB/PS2, Win/Mac.



Basic Optical Mouse

**\$24**

Websearch Code.....197239

5 Pack

**\$94**

Websearch Code.....197240

### Microsoft Basic Wireless Desktop

Reliable Microsoft optical technology in a great value wireless mouse and keyboard. Keyboard features a Multimedia Centre to easily navigate music, pictures and videos and instantly access popular functions. The precise mouse is comfortably designed for both right and left hand. USB/PS2 Interface, Win/Mac compatible.

**\$69**

Websearch Code.....210985

### Logitech QuickCam Orbit

The QuickCam Orbit features a black, ball-shaped camera that sits atop a nine-inch-high stand at your eye level so you get optimal face time during your video calls or video instant messaging sessions. When you move the camera follows further to this it combines a microphone and connects through USB.

• Quickcam Messenger (202543) \$71



QuickCam 4000

**\$143**

Websearch Code.....222558

Orbit Camera

**\$179**

Websearch Code.....209615

### Logitech diNovo Media Desktop

Apart from being a bluetooth keyboard and mouse, the diNovo MediaPad is a Bluetooth remote commander for all your digital media. The MediaPad displays email or instant message notifications and it lets you monitor media selection play back status, even when you're away from your desk.



Cordless Desktop MX

**\$245**

Websearch Code.....211021

Media Desktop

**\$351**

Websearch Code.....222637



**Imation  
CD-RW 24x Ultra  
Speed 10 Pack  
\$21**

## Imation CD Media

Imation CD-R and CD-RW media have a high-quality dye layer that ensures lower failure rates. Each disc is tested to meet Imation's exacting standards to protect against the toughest environmental conditions

### Websearch

195042  
194393  
223713  
196653  
205037  
246300  
246309  
213359

### Product Description

Imation CD-R Mini 23Min 202MB 5 Pack Neon  
Imation CD-R 80min 700MB 40x 50mm Jewel Case Black 20  
Imation CD-RW 10x-24x 650MB/74Min Ultra Speed 10 Pack  
Imation CD-RW Mini 185MB/21Min 10 Pack  
Imation CD-RW 80min 700MB 4X 10 Pack  
Imation CD-R 80min 700MB 4x-10x High Speed Neon 10 Pack  
Imation CD-R 40x 700MB/80Min Neon 25 Pack Spindle  
Imation CD/DVD Neon Slim Jewel Cases 25 Pack

### Price

\$5  
\$20  
\$21  
\$14  
\$14  
\$16  
\$16  
\$11



## Bonus Pack Promotion!

Instantly be rewarded with Bonus Media when you purchase selected Imation products!

### Websearch

246338  
246337  
246339  
246363

### Product Description

Imation CD-R 52x 700MB/80Min 10 + 2 Bonus Pack  
Imation CD-RW 4x 700MB/80Min 10+ 2 Bonus Pack  
Imation DVD-R 4x 4.7GB 5 + 1 Bonus Pack  
Imation 3.5" DSHD IBM 10 + 1 Bonus Pack (Bonus Diskette Neon)

### Price

\$8  
\$15  
\$15  
\$6

**Available  
while stocks  
last!**



**Imation 128MB USB  
2.0 Flash Drive  
\$72**

## Imation USB 2.0 Flash Drive

The Imation USB 2.0 Flash Drive is a compact, powerful flash drive. Featuring a patented "never lose" the cap swivel design to give you the sophisticated, professional look you seek from your personal technology. Weighing only one ounce, the drive fits easily around your neck, in your pocket or briefcase giving you convenient access to your drive, anytime, anywhere you are. Featuring lightning fast USB 2.0 drive speed—data can be read up to 8MB/second and written up to 7MB/second—saving you valuable time when transferring, sharing or storing your critical data.

### Websearch

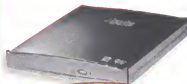
222111  
222112  
222113  
222110

### Product Description

Imation 128MB USB 2.0 Flash Drive  
Imation 256MB USB 2.0 Flash Drive  
Imation 512MB USB 2.0 Flash Drive  
Imation 1GB USB 2.0 Flash Drive

### Price

\$72  
\$125  
\$248  
\$484



**Imation DVD Dual Format  
4x2x2 50mm External Drive  
\$341**

## Imation CD-RW and DVD Drives

Whether you choose CD or DVD to backup, Imation have the Optical Drive to suit your needs! Now you can create your own digital masterpieces and share them with ease. All Drive Kits come complete with everything you need to get started, including the latest software.

### Websearch

213357  
214191  
224480

### Product Description

Imation CD-R Drive 52x 32x 52x Internal IDE  
Imation DVD-R/RW Drive 8x4x8x4 Internal  
Imation DVD-R/RW Drive 2x2.4x2x2 Slim External

### Price

\$66  
\$220  
\$341

## Imation 4mm, 8mm DLT, LTO & SDLT Tape Cartridges

### Websearch

192766  
192767  
194261  
194474  
192707  
194262  
192768  
196261

### Product Description

Imation Data Tape 4mm 125m D0S-3  
Imation Data Tape 4mm 150m D0S-4  
Imation Data Tape AIT 2 8mm 230m 50/100GB  
Imation Data Tape AIT 3 8mm 100/260GB  
Imation Data Tape DLT IV 2080GB (drive dependent)  
Imation Data Tape Super DLT 160/320GB (drive dependent)  
Imation Data Tape LTO Ultrium 100/200GB (drive dependent)  
Imation LTO Ultrium Gen 2 200/400GB Cartridge

### Price

\$13  
\$19  
\$88  
\$95  
\$44  
\$81  
\$49  
\$88



**Imation Data Tape  
Super DLT 160/320GB  
\$81**

## Apacer Audio Steno

Apacer Audio Steno BP300 is a USB flash drive with MP3 player and voice recorder. All functions and features are packed in a compact, easy-to-carry design. With Audio Steno BP300, you can enjoy the music and store data whenever you need. Use Audio Steno BP300 and fill your life with digital excitement.



**\$139**

Websearch Code 223765

## Apacer Audio Steno NV400

Apacer Audio Steno NV400 is a brand new 4-in-1 USB drive. It's functions include MP3 playback, voice recording and SD/MMC card reading. With this new Apacer Audio Steno NV400, users can save MP3 files and enjoy the music instantly.

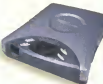


**\$119**

Websearch Code 223743

## Apacer Disc Steno CP200

Apacer Disc Steno CP200 is a portable photo CD burner designed for photographers, business professionals and travellers. With no PC needed, Disc Steno CP200 makes it easier for you to copy data from flash cards to CD-R/CD-RW. In addition, you can display shots by connecting the unit to your television.



**\$399**

Websearch Code 211972

# Genuine Printer Supplies Computer Products at Rock Bottom Prices

## Crumpler Roll-O-Notes

- Fits laptops with screens up to 14.1"
- Waterproof ripstop lining
- Thick protective padding
- Internal zip pockets
- Quick Flip buckle and adjustable laptop sleeve
- Comes in red/night blue, navy/oatmeal, black/grey, oatmeal/orange and olive/green



**\$86**

Websearch Code 2036172

## Crumpler Wack-O-Phone

- Fits laptops with screens up to 15.1"
- Heavy duty padding and shoulder strap
- Internal and external zip pockets
- Escape hole for audio or communication devices
- Quick Flip buckle and adjustable laptop sleeve
- Comes in red/night blue, navy/oatmeal, black/grey, oatmeal/orange and olive/green



**\$100**

Websearch Code 203674

## Crumpler Very Busy Man

- Fits laptops with screens up to 16"
- Waterproof ripstop lining
- Heavy duty padding and shoulder strap
- Internal zip pockets
- Quick Flip buckle and adjustable laptop sleeve
- Comes in red/night blue, navy/oatmeal, black/grey, oatmeal/orange and olive/green



**\$108**

Websearch Code 191487



## HP DeskJet Cartridges

Websearch	Product Description	Price
226131	HP Ink Cartridge No 15 Black for DJ 810/812/840/845 - C6615DA	\$69
223829	HP Ink Cartridge No 45 Black for DJ 710C/720C/830C - C1645AA	\$73
226130	HP Ink Cartridge No 56 Black for DJ 5550 - C6656AA	\$49
HWP392	HP Ink Cartridge No 10 Black for DJ 2000C/2500C - C4844AA	\$48
190163	HP Ink Cartridge No 11 Cyan for DJ 500/800 - C4836AA	\$48
190162	HP Ink Cartridge No 11 Magenta for DJ 500/800 - C4837AA	\$48
194445	HP Ink Cartridge No 11 Yellow for DJ 500/800 - C4838AA	\$48
212004	HP Ink Cartridge No 14 Black - C5011DA	\$36
212003	HP Ink Cartridge No 14 Colour - C5010DA	\$48
192529	HP Ink Cartridge No 15 Black for DJ 810C/812C/840C/845C - C6615DA	\$41
HP1032	HP Ink Cartridge No 17 Colour for DJ 840/845 - C6625AA	\$45
HP1034	HP Ink Cartridge No 20 Black for DJ 610C/630C/640C - C6614DA	\$41
130079	HP Ink Cartridge No 23 Colour for DJ 720C/880C/890C - C1823DA	\$49
190611	HP Ink Cartridge No 26 Black for DJ 400/420/500 - C1626AA	\$44
193787	HP Ink Cartridge No 27 Black for DJ 3420 - C8727AA	\$27
193788	HP Ink Cartridge No 28 Colour for DJ 3420 - C8728AA	\$32
224971	HP Ink Cartridge No 29 Black for DJ 600/610/630C - C1629AA	\$44
190196	HP Ink Cartridge No 45 Black for DJ 710C/720C/830C - C1645AA	\$44
224535	HP Ink Cartridge No 49 Colour for DJ 600/610/630C - C1649AA	\$45
224969	HP Ink Cartridge No 56 Black for DJ 5550 - C6656AA	\$29
226193	HP Ink Cartridge No 57 Colour for DJ 5550C - C6657AA	\$49
224527	HP Ink Cartridge No 58 Photo Colour for DJ 5550 - C6658AA	\$36
212303	HP Ink Cartridge No 59 Grey Photo - C9359AA	\$38
190354	HP Ink Cartridge No 78 Colour for DJ 900/1220C - C6578DA	\$49
223939	HP Ink Cartridge No 78 Large Colour for DJ 900/1220C - C6578AA	\$88

## HP Mono LaserJet Toner Cartridges

Websearch	Product Description	Price
212302	HP Toner Cartridge for LaserJet 1010/1015 - Q2612A	\$97
HWP001	HP Toner Cartridge for LaserJet 1100/3200 Series 2,500 Pages - C4092A	\$82
212300	HP Toner Cartridge for LaserJet 1150 Series - Q2624A	\$109
192755	HP Toner Cartridge for LaserJet 1200 Series 3,500 Pages - C7115X	\$107
197391	HP Toner Cartridge for LaserJet 1300 Series 4,000 Pages - Q2613X	\$124
HWP002	HP Toner Cartridge for LaserJet 2100/2200 Series 5,000 Page - C4096A	\$167
206312	HP Toner Cartridge for LaserJet 2300 Series - Q2610A	\$117
129465	HP Toner Cartridge for LaserJet 45 Series 6,000 Pages - 92298A	\$133
192571	HP Toner Cartridge for LaserJet 4000 Series 10,000 Pages - C4127X	\$177
192673	HP Toner Cartridge for LaserJet 4100 Series 10,000 Pages - C8061X	\$177
196353	HP Toner Cartridge for LaserJet 4200 Series 12,000 Pages - Q1338A	\$212
121299	HP Toner Cartridge for LaserJet 4300 Series - Q1339A	\$282
129890	HP Toner Cartridge for LaserJet 8100 Series 20,000 Pages - C4182X	\$261
121301	HP Toner Cartridge for LaserJet 9000 Series 30,000 - C8543X	\$382
222948	HP Toner Cartridge for LaserJet 5P/5MP/6P/6MP Series - C3903A	\$114
189212	HP Toner Cartridge for LaserJet 1200 Series 2,500 Pages - C7115A	\$86
AUC125	HP Toner Cartridge for LaserJet 5L/6L Series - C3906A	\$86
189501	HP Toner Cartridge for LaserJet 5000 - C4129X	\$227

## HP Colour LaserJet Toner Cartridges

Websearch	Product Description	Price
212288	HP Toner Cartridge for Colour LaserJet 1500/2500 Black - C9700A	\$115
212289	HP Toner Cartridge for Colour LaserJet 1500/2500 Cyan - C9701A	\$139
212290	HP Toner Cartridge for Colour LaserJet 1500/2500 Magenta - C9703A	\$139
212291	HP Toner Cartridge for Colour LaserJet 1500/2500 Yellow - C9702A	\$139
213667	HP Toner Cartridge for Colour LaserJet 3500/3700 Black - Q2670A	\$183
213670	HP Toner Cartridge for Colour LaserJet 3500/3700 Cyan - Q2671A	\$183
213669	HP Toner Cartridge for Colour LaserJet 3500/3700 Magenta - Q2672A	\$183
212282	HP Toner Cartridge for Colour LaserJet 4600/4650 Black - C9720A	\$215
224533	HP Toner Cartridge for Colour LaserJet 4600/4650 Cyan - C9721A	\$291
224534	HP Toner Cartridge for Colour LaserJet 4600/4650 Magenta - C9722A	\$291
224532	HP Toner Cartridge for Colour LaserJet 4600/4650 Yellow - C9723A	\$291
212287	HP Toner Cartridge for Colour LaserJet 5500 Black - C9730A	\$311
194492	HP Toner Cartridge for Colour LaserJet 5500 Cyan - C9731A	\$436
194493	HP Toner Cartridge for Colour LaserJet 5500 Magenta - C9732A	\$436
194494	HP Toner Cartridge for Colour LaserJet 5500 Yellow - C9733A	\$436
212292	HP Toner Cartridge for Colour LaserJet 8500 Black - C4150A	\$158
212293	HP Toner Cartridge for Colour LaserJet 8500 Cyan - C4151A	\$246
212295	HP Toner Cartridge for Colour LaserJet 8500 Magenta - C4152A	\$246
212294	HP Toner Cartridge for Colour LaserJet 8500 Yellow - C4153A	\$246

Visit [www.lswh.com.au](http://www.lswh.com.au) for the full range of the above listed brands and other popular brands including Kyocera-Mita, Minolta, Samsung and Oki not listed here.



**iswh**

Hardware  
Software  
Consumables

Genuine Printer Supplies

## Canon BubbleJet Cartridges

Websearch Product Description

		Price
222952	Canon Ink Cartridge for BJ 3000/5400/5400SP Black - BC13EBK	\$20
130499	Canon Ink Cartridge for BJ 3000/5400/5400SP Cyan - BC13EC	\$17
130498	Canon Ink Cartridge for BJ 3000/5400/5400SP Magenta - BC13EM	\$17
130497	Canon Ink Cartridge for BJ 3000/5400/5400SP Yellow - BC13EY	\$17
189066	Canon Ink Cartridge for BJ 4000/4100/4550 Black - BC121BK	\$13
189067	Canon Ink Cartridge for BJ 4000/4100/4550 Colour - BC121C	\$31
192570	Canon Ink Cartridge for BJ 5200SP/250/5300/320/330/350/450/4700 Black - BC124BK	\$13
210402	Canon Ink Cartridge for BJ 5200SP/250/5300/320/330/350/450/4700 Colour - BC124C	\$22
211894	Canon Ink Cartridge for BJ 5200SP/250/5300/320/330/350/450/4700 Black Twin - BC124	\$44
192569	Canon Ink Cartridge for BJ 5200SP/250/5300/320/330/350/450/4700 Colour - BC124C	\$25
190434	Canon Ink Cartridge for BJ 5800/5820/5830/5900/5950/6100/6900/6950 Black - BC16BK	\$22
190436	Canon Ink Cartridge for BJ 5800/5820/5830/5900/5950/6100/6900/6950 Cyan - BC16C	\$22
190437	Canon Ink Cartridge for BJ 5800/5820/5830/5900/5950/6100/6900/6950 Magenta - BC16M	\$22
190439	Canon Ink Cartridge for BJ 5800/5820/5830/5900/5950/6100/6900/6950 Yellow - BC16Y	\$22
210442	Canon Ink Cartridge for BJ 170 Black - BC115BK	\$24
210443	Canon Ink Cartridge for BJ 170 Colour - BC115C	\$40
CAN054	Canon Ink Cartridge for BJ 210/210SP/240/255SP/265SP/1000SP Colour - BC05	\$48
CAN236	Canon Ink Cartridge for BJ 210SP/255SP/265SP/1000SP Black - BC05	\$35
225047	Canon Ink Cartridge for BJ 5100SP/2000SP/4000/4100/4550/4650/5500 Black - BC20	\$51
189067	Canon Ink Cartridge for BJ 5100SP/4000/4100/4550/4650/5500 Colour - BC20C	\$33
190435	Canon Ink Cartridge for BJ 5800/5820/5900/5950/6100/6900/6950 Photo Cyan - BC16PC	\$22
190438	Canon Ink Cartridge for BJ 5800/5820/5900/5950/6100/6900/6950 Photo Mag - BC16PM	\$22



## Epson Stylus Ink Cartridges

Websearch Product Description

		Price
193775	Epson Ink Cartridge for Stylus C41UX/SX/C43UX/SX Black - T038	\$15
200348	Epson Ink Cartridge for Stylus C41UX/SX/C43UX/SX Colour - T039	\$26
130914	Epson Ink Cartridge for Stylus C60/61 Black - T028	\$39
189243	Epson Ink Cartridge for Stylus C60/61 Colour - T029	\$33
211440	Epson Ink Cartridge for Stylus C63/CB3 Black - T0461	\$19
211443	Epson Ink Cartridge for Stylus C63/CB3 Cyan - T047290	\$20
211444	Epson Ink Cartridge for Stylus C63/CB3 Magenta - T047390	\$20
211445	Epson Ink Cartridge for Stylus C63/CB3 Yellow - T047490	\$20
208296	Epson Ink Cartridge for Stylus C70/CB0/CB2 Black - T032190	\$41
190623	Epson Ink Cartridge for Stylus C70/CB0 Cyan - T032290	\$20
190624	Epson Ink Cartridge for Stylus C70/CB0 Magenta - T032390	\$20
208314	Epson Ink Cartridge for Stylus C70/CB0 Yellow - T032490	\$20
208312	Epson Ink Cartridge for Stylus C82 Cyan - T042290	\$18
208313	Epson Ink Cartridge for Stylus C82 Yellow - T042390	\$18
213662	Epson Ink Cartridge for Stylus 440/600/640 Black - T050190	\$18
213665	Epson Ink Cartridge for Stylus 440/600/640 Colour - T050290	\$31
213709	Epson Ink Cartridge for R210/R310/RX/S10 Black - T0491	\$19
213658	Epson Ink Cartridge for R210/R310/RX/S10 Cyan - T0492	\$19
213661	Epson Ink Cartridge for R210/R310/RX/S10 Light Cyan - T0495	\$19
213710	Epson Ink Cartridge for R210/R310/RX/S10 Light Magenta - T0496	\$19
213659	Epson Ink Cartridge for R210/R310/RX/S10 Magenta - T0493	\$19
213660	Epson Ink Cartridge for R210/R310/RX/S10 Yellow - T0494	\$19
189102	Epson Ink Cartridge for Stylus 810/830U/925/935 Black - T026	\$33
189101	Epson Ink Cartridge for Stylus 810/830U/925/935 Colour - T027	\$27
EP5404	Epson Ink Cartridge for Stylus 870/890/895/1270/1290 Black - T007	\$25
EP5406	Epson Ink Cartridge for Stylus 1270/1290 Colour - T009	\$34



## Fuji Xerox Phaser Toner Cartridges

Websearch Product Description

		Price
214644	Fuji Xerox Toner Cartridge for DP240A/340A 10k	\$179
214643	Fuji Xerox Toner Cartridge for DP205AP/305AP 10k	\$254
209339	Fuji Xerox Toner Cartridge for C1618 Black	\$78
209341	Fuji Xerox Toner Cartridge for C1618 Cyan	\$251
209342	Fuji Xerox Toner Cartridge for C1618 Magenta	\$251
209340	Fuji Xerox Toner Cartridge for C1618 Yellow	\$251
204633	Fuji Xerox Colour Sticks for Phaser 8200 Black Pack 5	\$157
204632	Fuji Xerox Colour Sticks for Phaser 8200 Yellow Pack 5	\$321
204631	Fuji Xerox Colour Sticks for Phaser 8200 Magenta Pack 5	\$321
204630	Fuji Xerox Colour Sticks for Phaser 8200 Cyan Pack 5	\$321
211819	Fuji Xerox Toner Cartridge for Phaser 6250 Hi Cap Black	\$317
211816	Fuji Xerox Toner Cartridge for Phaser 6250 Hi Cap Cyan	\$317
211817	Fuji Xerox Toner Cartridge for Phaser 6250 Hi Cap Magenta	\$317
211818	Fuji Xerox Toner Cartridge for Phaser 6250 Hi Cap Yellow	\$317
214442	Fuji Xerox Toner Cartridge for C2428 Hi Cap Black	\$178
214444	Fuji Xerox Toner Cartridge for C2428 Hi Cap Cyan	\$502
214446	Fuji Xerox Toner Cartridge for C2428 Hi Cap Magenta	\$502
214427	Fuji Xerox Toner Cartridge for C2428 Hi Cap Yellow	\$502



## Verbatim DataLifePlus CD-R 80min 52x 10 Pack (Slim Case)

Verbatim's innovative "Super Azo" recording dye is optimised to provide stable and reliable high-speed recording and the industries widest range of compatibility for today's 52x CD-R drives. Features a dual-protection layer that safeguards the recording layer and provides a longer archival life.



\$9

Websearch Code 193846

## Verbatim Vinyl CD-R 80min 10 Pack (Jewel Case)

A recordable disc designed after the popular and groovy 45-rpm record format. The colour-coded disc uses Verbatim's original Azo Blue technology for superior audio writing performance on CD burners and broad read compatibility on car CD players.

• 50 Spindle (212702) \$29



\$9.50

Websearch Code 210182

## Verbatim 4.7GB Movie Reel Video DVD's

These 4.7GB discs look, and even feel, like a Hollywood movie reel. These mini reels are perfect for home movies, business presentations and transferring files and come in a clear DVD case.

• DVD-R (214498) \$10



DVD-R

\$10

Websearch Code 214497



www.iswh.com.au

click here to buy...

29



## Microsoft Works 7

Works 7 is the latest version of the popular essential home productivity software. It includes a word processor, spreadsheet, database, calendar. Plus Works has new, professionally designed templates and a new tool to help organise common projects.

Licensing and academic licensing price available.



Upgrade to Office 2003 from Works 7

**\$79**

Websearch Code 19140

## Microsoft Digital Image Suite 9

Digital Image Suite offers one integrated complete solution for all of your digital imaging needs. Packed with all of the tools you need to organise your photos, edit them using hundreds of tools, print and share your work and archive photos for safekeeping.

Licensing and academic licensing price available.



**\$155**

Websearch Code 20038

## Microsoft Encarta Premium Suite 2004

Encyclopedia with research and learning tools. Dictionary & Thesaurus, Literature Guides and Chart Maker. Licensing and academic licensing price available.

- Standard (210856) \$39
- Plus (209495) \$73



**\$99**

Websearch Code 20946-20947

## Microsoft Works Suite 2002

Works Suite includes five popular Microsoft home products in one, easy-to-use package. Works Suite includes Microsoft Works, Microsoft Word and the latest versions of Microsoft Money Standard, Microsoft Encarta standard, and Microsoft Picture It! Photo Premium.



Upgrade to Office 2003 from Works Suite

**\$183**

Websearch Code 20945

## Microsoft MSDN Universal 7

Provides priority access to essential resources for developers, including timely delivery of everything you need to build XML Web services and applications. Get uninterrupted access to the latest Microsoft technologies 24 hours a day 7 days a week online and through regular CD or DVD updates.

- Upgrade/Renewal (189644) \$3595
- Full (130922) \$4345



\*for non-commercial use only

Academic\*

**\$1299**

Websearch Code 130972

## Microsoft Exchange Server 2003 Standard

Designed to meet the messaging and collaboration needs of small and medium-size corporations. With Exchange 2003 Standard Edition, you get Exchange 2003. The flexibility to be configured as a Microsoft Office Outlook Web Access front-end server. 16-gigabyte data storage maximum. Recovery Storage Group.

- Full (209489) \$1998



\*for non-commercial use only

Academic\*

**\$1049**

Websearch Code 20948

## Microsoft Visual Studio.net Professional

Visual Studio.net Professional will enable developers to build next generation Internet applications that target any Internet device and integrate with any platform.

- Upgrade (21372) \$835
- Full (213874) \$1685



\*for non-commercial use only

Academic\*

**\$141**

Websearch Code 196749

## Microsoft Publisher 2003

Publisher 2003 is a comprehensive solution for creating and publishing a wide variety of publications for desktop printing, commercial printing, e-mail distribution, or viewing on the Web. Publisher 2003 looks and works more like other programs in the Microsoft Office System, making it easier to use the right Office tool for the task.

- Upgrade (210107) \$165
- Full (210106) \$275



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Academic\*

**\$145**

Websearch Code 210105

## Microsoft Visio 2003 Std

Microsoft Office Visio 2003 gives business and technical users the power to visualise and communicate ideas, information, and systems. Use the simple, flexible tools in Visio 2003 to easily create business and technical charts and graphics that capture your inspiration and communicate it with impact.

- Standard Upgrade (210120) \$155
- Full (210119) \$315



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Academic\*

**\$95**

Websearch Code 210118

## Microsoft Small Business Server 2003

Access your desktop remotely from any browser - anywhere in the world - 24x7. Collaborate on projects via an auto deployed Windows Sharepoint Services site. Best of breed email and calendaring solution with Exchange 2003 and Outlook 2003.

- S85 2003 Premium (211369) \$2349



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Academic\*

**\$999**

Websearch Code 211368

## Microsoft Visual Basic .net Standard

Reengineered to be a first-class language on the Microsoft .NET Framework, it provides the easiest and most productive route for new developers and existing Visual Basic programmers to quickly build Windows-based applications.

- Full (197083) \$165



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Academic\*

**\$88**

Websearch Code 197350

## Microsoft FrontPage 2003

Use enhanced design tools to produce better looking Web sites. Generate better code, or expand your code skills. Use built-in scripting tools for interactive results. And with professional coding tools, you can write code faster, more efficiently, and with greater accuracy. Connect with people and information in new ways by building Extensible Markup Language (XML) data-driven Web sites.

- Upgrade (210089) \$168
- Full (210088) \$338



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Academic\*

**\$155**

Websearch Code 210087

## Microsoft Visio 2003 Pro

Microsoft Office Visio Professional 2003 includes a full range of diagrams for business and technical professionals to create network and directory service diagrams, database website diagrams, engineering drawings and building space and floor plans.

- Pro Upgrade (210117) \$385
- Full (210116) \$785



\*for non-commercial use only

Academic\*

**\$219**

Websearch Code 210115

## Microsoft SQL Server 2000 Standard

Relational Database Management and Analysis System. Great support for Web standards, powerful tools for system management and tuning, and exceptional scalability and reliability for your money make SQL Server 2000 the best choice for the next generation of enterprise-class database solutions.

- Full S Client (193920) \$2299



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Academic 10 Client\*

**\$1489**

Websearch Code 130171

## Microsoft Visual C++ .net Standard

Visual C++ .NET is the most powerful C++ tool for creating the highest-performance software for the Internet and the Web. Including features like, IntelliSense Technology, Edit and Continue which significantly speeds the development process.

- Full (197469) \$165



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Academic\*

**\$88**

Websearch Code 197470





## Why get 2003 MS Office?

Microsoft Office 2003 Editions deliver significant improvements over previous versions of Office, including:

- Advanced e-mail management tools to help you fight back against spam and viruses better than ever before.
- Improved automatic document recovery and compatibility with older files, which mean fewer worries about lost data.
- Brand-new collaboration features to allow you to share work easily and stay connected anytime, anywhere.

MS Office 2003 Editions work best with Windows XP

- If you use Windows XP or Windows 2000, then Office 2003 is the right choice for you.
- If you use Windows 98 or Windows Me, you should consider upgrading to Windows XP.
- If upgrading to Windows XP is not an option for you, then Office XP is the best way to go.

## Microsoft Windows XP Home

Windows XP Home Edition is an excellent choice for most home users, with exciting new features that help you do more with your computer.

## Microsoft Windows XP Professional

Windows XP Professional, provides the highest levels of performance, productivity and security. It is the best choice for business users and for home users who demand the most from their systems.



Home	
Upgrade <b>\$199</b> Websearch Code: MSS701	Full <b>\$399</b> Websearch Code: MSS700
Professional	
Academic Upgrade* <b>\$145</b> Websearch Code: MSS704	Full <b>\$589</b> Websearch Code: MSS702
Upgrade <b>\$398</b> Websearch Code: MSS703	

## Microsoft Project Standard 2003

Microsoft Office Project Standard 2003 is used by project managers who need a desktop tool to manage their projects independently but who do not require strong coordination with other project managers or the ability to manage resources from a central repository.

- Upgrade (210110) \$535
- Full (222991) \$935



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Academic*	<b>\$99</b>
Websearch Code:	210108

## Microsoft Project Professional 2003

Microsoft Office Project Professional 2003 is the desktop enterprise project management program that is used with MS Office Project Web Access and MS Office Project Server 2003. All the core scheduling tools in Project Standard 2003, plus powerful portfolio and resource management capabilities when connected to Project Server 2003.

- Upgrade (210112) \$935
- Full (210111) \$1549



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Academic*	<b>\$271</b>
Websearch Code:	209772

Microsoft Office	Student & Teacher Edition*	Standard Edition	Small Business Edition	Professional Edition
Word	•	•	•	•
Excel	•	•	•	•
PowerPoint	•	•	•	•
Outlook	•	•	•	•
Outlook with Contact Manager			•	•
Publisher			•	•
Access				•
Enhanced XML Technology				•
Enhanced CRM Technology				•

\* For non-commercial use only. Must be a "Qualified Educational User." See Student and Teacher Edition 2003 package for details.

Standard Edition Upgrade	Standard Edition Full	Small Business Upgrade	Small Business Full
<b>\$385</b> Websearch Code: 210093	<b>\$635</b> Websearch Code: 210092	<b>\$449</b> Websearch Code: 210098	<b>\$725</b> Websearch Code: 210097
Student & Teacher Edition*	Pro Edition Academic	Pro Edition Upgrade	Pro Edition Full
<b>\$249</b> Websearch Code: 210114	<b>\$295</b> Websearch Code: 210094	<b>\$515</b> Websearch Code: 210096	<b>\$795</b> Websearch Code: 210095

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## Microsoft Plus! Digital Media Edition

Share your photos and enjoy your music and home movies. Create vibrant photo stories with your narration, music and photo effects. Transform your PC into a full-featured party jukebox with visual effects while protecting your personal information and restricting access to other applications. Copy your aging cassette tapes and vinyl records into clean, vibrant digital files using his and pop reduction, track splitting and more.



**\$39**  
Websearch Code: 194602

## Office 2004 for Mac Student & Teacher

Microsoft Office 2004 for Mac Student and Teacher Edition offers:

- Full versions of the leading productivity applications from Microsoft.
- Rights to install on three computers in your household.



**\$272**

Websearch Code: 224917

## Office 2004 for Mac Standard

Transform the way you create, share and manage ideas and information. Includes 2004 versions of Word, Entourage, Excel and PowerPoint and a host of groundbreaking new features. Licensing and academic licensing price available.

\* Full (224819) \$645



Upgrade <b>\$399</b> Websearch Code: 224818
---

## Office 2004 Pro for Mac

Includes 2004 versions of Word, Entourage, Excel, and PowerPoint - designed exclusively for Mac OS X. Plus, this edition of Office includes Virtual PC 7 for Mac with Microsoft Windows XP Professional.



NEW Version Available soon

Pre-Order Now

## Windows Server 2003

Windows Server 2003 Standard Edition is the network operating system for small organisations and departmental use. It delivers intelligent file and printer sharing, secure Internet connectivity, centralised desktop application deployment, and Web solutions that connect employees, partners, and customers.

- Std 5 Client (195945) \$1595
- Std 10 Client (195946) \$1888

Enterprise Available.

Std 5 Client Academic*	Std 10 Client Academic*
<b>\$685</b> Websearch Code: 195944	<b>\$835</b> Websearch Code: 195947



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## VERITAS Backup Exec 9.1 (For SBS)

Comprehensive, cost effective protection for Microsoft Windows server environments. High performance agents and options deliver flexibility to help protect data quickly and reliably.

• Premium (214593) \$999



From \$609\*  
Per License

## Microsoft Volume Licensing

Microsoft's Open Licensing program offers benefits when purchasing or acquiring multiple copies of Microsoft software. Designed for organisations with as few as two PCs and purchasing as few as five licenses on the initial order. Receive significant discounts over retail full packaged product prices - minimum 20% saving!

\*Office 2003 Standard based on minimum 5 license purchase if you are a new MQLP customer. Office 2003 Professional from \$779 based on minimum 5 license purchase if you are a new MQLP customer.

Microsoft

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accounts team on  
1300 761 761 to SAVE!



Standard  
**\$770**  
Websearch Code 714597



From \$1499\*  
Per License

## Adobe Transactional License Program

The Adobe Transactional License Program (TLP) is a volume licensing solution that allows organisations to acquire Adobe software at a discount, based on the quantity of software licensed in a single transaction. Each Adobe product is assigned a point value (e.g. Acrobat = 1 point), and you receive a volume discount based on the point value of your transaction. Minimum 5 points to qualify!

City Software has recently become 1 of 5 Adobe Licensing Centres in Australia!

\*Adobe Creative Suite Standard (Includes Photoshop, Illustrator, InDesign & Version Cue) based on minimum 5 point purchase (Adobe CS Std = 3 points) on Corporate TLP program. Adobe Creative Suite Premium (Includes Photoshop, Illustrator, InDesign, GoLive, Acrobat 6 Professional & Version Cue) from \$1,979 per license based on minimum 5 point purchase (Adobe CS Pro = 6 points) on Corporate TLP program.



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accounts team on  
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## CA ARCserve Backup 11

Manage multiple backup jobs, devices and databases with one single view. Select multiple servers, clients and databases. Restore files from a single file to a whole volume.



Full  
**\$899**  
Websearch Code 246717



From \$575\*  
Per License

## Macromedia Volume License Program (MVL)

Whether you are a commercial, government, or education customer, the Macromedia Volume License Program (MVL) offers flexible licensing solutions that help volume customers save time and money. Both software and subscription offerings are available through MVL. Each product/offering is assigned a point value. 12 points are the minimum requirement for initial orders, 0 points for re-orders. For example, Studio MX is worth 4 points, Dreamweaver is worth 2 points, etc.

\*Macromedia Dreamweaver MX 2004 based on new commercial customer purchasing with minimum of 10 points.



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1300 761 761 to SAVE!



From \$75\*  
Per License

## Symantec Security Licence Program

The Symantec Security Licence Program makes it easy to purchase Symantec enterprise security software solutions. The Symantec Value Program is a simple transactional plan that provides volume incentives for orders of as few as one server or 10 desktop licences, and rewards the purchase of multiple product types within a product family. As a certificate-based program, the Symantec Value Program is ideal for small to mid-sized companies. Customers simply purchase a media pack and the number of licences required from their reseller, and then receive the certificate from Symantec. Special pricing for academic institutions is also offered through the Value Program.

\*AntiVirus Corporate Edition 9.0 (Workstation & Network Server) on minimum 10 license purchase (10-24 user pricing) on Symantec VLP.



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## CA eTrust Antivirus 7.1

For Windows Workgroup  
Edition - 5 clients

CA's award-winning antivirus solution. Automated virus signature updates and centralised management ensure your network is protected against potentially damaging and costly virus incidents.

• 10 User (246720) \$385



5 User  
**\$199**  
Websearch Code 246719



From \$999\*  
Per License

## Veritas VIP Volume Software License Program

VERITAS' VIP program is a cost effective way to easily acquire and deploy their market leading storage management software - Backup Exec. VIP offers customers volume purchase incentives, immediate discounts, flexibility to suit their business needs and a simply point system - tracked by VERITAS.

Enrolments in the open plan requires an initial order of only 10 points - it is simple to qualify. The initial price depends upon the number of accumulated points at the time of purchase. Future orders may increase the discount.

\*For any VIP purchase made from 1st September to 31st December, 2003 - Level A and Level B pricing will be combined. This means that all purchases between 7 - 999 points will qualify for Level B pricing.  
EG: Backup Exec 9 Windows Server Mandatory Support (Vsusupport) - \$239  
Backup Exec 9 Windows Server Mandatory Support (Vsusupport) - \$239



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Call for  
Best Price!

## Computer Associates (CA) Licensing Benefits

Customers who purchase "Product + Maintenance" SKUs under CA's Licensing programs - Open Licence Program (OLP) or Master Licence Program (MLP) - receive the following benefits: 1) Software Licence purchased, 2) Upgrade Protection - which entitles the Licensee to free product upgrades; and 3) 866 or 24/7 telephone-based technical support. SKUs are available in 1, 2 or 3-year options.

Note: Government and Academic customers automatically qualify for the CA Master Licence Program which provides them with the best possible pricing.

\*Trust Secure Content Management (eSCM) provides organisations with an integrated, policy-based content security solution to defend against business and network integrity threats. These threats include misuse of email (Spam) and the Web, confidentiality breaches, exposure to email legal liability, unsolicited email, viruses, mobile code threats and other offensive material.



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**MAUS MasterPlan**

Write a winning Business Plan...the easy way!

Research suggests that on average, businesses with a working Business and Marketing Plan achieve 63% higher revenue growth and 58% higher profit growth.

MasterPlan allows you to develop Business and Marketing Plans, complete with a full set of financials, actual vs. budgeted comparisons and graphical analysis. Designed for people who need a professional plan with a minimum of fuss, the software uses a simple question and answer format, complete with sample text to lead you through the entire planning process.

MasterPlan will prompt you with ideas and suggestions and will demonstrate through real life examples how you can analyse your business and prepare successful strategies for the future. The range of plans available are ideal for everything from loan applications through to setting strategic direction, while the financial wizard allows you to develop customised spreadsheets and conduct "what if" analysis on all of your forecasts.

MasterPlan is the quickest and simplest way to create winning business plans to revolutionise your business!

**Key Features:**

- Simple question and answer format
- Unique sample text function
- Wide range of planning styles
- Automatically calculates financials and produces graphs
- Financial Setup wizard for customised spreadsheets
- Fully GST compliant
- Contains hundreds of business resource templates including debt collection and publicity management tools
- Expert advice, extensive help functions and "tip of the day"

**New features include:**

- Updated sample text
- Strategic overview & summary planning
- IT/online planning
- Easy user interface for simple navigation
- Business calculators
- Self diagnostic tools and analysis
- Reports function
- Expanded financial spreadsheets

**NEW  
Version  
Release!****MAUS Stockmarket Plus 5**

MAUS Stockmarket Plus is a comprehensive, yet simple to use portfolio management tool that allows you to keep track of your investments and make informed and profitable investment decisions.

The software generates instant profit &amp; loss reports, allows you to test the profitability of different investment opportunities and even provide a tax assessment of your investments!

**\$165**

Websearch Code ..... 191498

**MAUS Employee Manual**

Use the simple question and answer format to create a comprehensive, plain English employee handbook that covers everything from payment of wages &amp; standards of conduct through to training &amp; termination procedures.

MAUS Employee Manual will ensure you have productive and motivated staff whilst protecting your business from costly litigation such as unfair dismissal

Enterprise  
(223854) \$399**\$190**Professional  
Websearch Code ..... MAU011**MAUS Performance Review**

Document ongoing staff performance and save time and money in creating personalised, grammatically correct performance reviews.

Simply choose from dozens of performance criteria to suit the position, use the simple grading system to rate your employee in each area and MAUS Performance Review will automatically support your ratings with clear, effective text.

**\$249**

Websearch Code ..... 189762

**MAUS Policies Manual**

Develop a complete operations handbook that incorporates procedures, workflow documents and business forms into one comprehensive reference manual with MAUS Policies Manual.

This innovative software will allow you to quickly and simply create a handbook that is specific to your business, not just a collection of standardised policies and procedures.

**\$249**

Websearch Code ..... 223850

**MAUS Job Descriptions**

Create a detailed outline of employee responsibilities and roles, educational requirements, work environment and even necessary job knowledge in minutes with MAUS Job Descriptions.

This innovative and easy to use software comes complete with a library of over 3,800 customisable position descriptions. Give your employees the information they need to maintain focus and work smarter!

**\$249**

Websearch Code ..... 191674

**MAUS Health & Safety Planner**

Ensure your business is protected from the loss of time and money associated with injuries and accidents in the workplace with MAUS Health &amp; Safety Planner. Create an OH&amp;S committee, action plans and emergency procedures as well as monitor ongoing safety performance with ease!

This is an affordable and practical software application that will guide you step by step.

Enterprise  
(223856) \$425**\$190**Professional  
Websearch Code ..... 129968**Dragon Naturally Speaking 7 Standard**

Simply talk to your computer and your words instantly appear. Launch programs, create, edit and format documents, and manage the desktop - all by voice! Includes headset microphone.

• Essentials (207885) \$106

**\$176**

Websearch Code ..... 196420

**Dragon Naturally Speaking 7 Preferred**

After completing about 5 minutes of training, you can talk to your computer and watch your words instantly appear in virtually any Windows based application. Create Reports, spreadsheets and business letters - at up to 160 words-per-minute!

- Preferred Upgrade (196419) \$186
- Professional (207884) \$1,585
- Pro Upgrade (207883) \$489

**\$335**

Websearch Code ..... 197400

**Dragon Naturally Speaking 7 Mobile**

Dictate documents and notes on the move. Back in the office simply plug the recorder into the PC, transfer your file and let Dragon Naturally Speaking Preferred automatically transcribe your dictation. Includes a certified digital recorder, special linking software and a high-quality headset microphone.

**\$536**

Websearch Code ..... 210772

**Extensis Portfolio 6.1**

Portfolio is the perfect tool for tracking, organising and distributing digital photos and other image files. Transform your chaotic jumble of digital files into a fully searchable catalog in minutes.

Mac OS X Compatible



Portfolio 6.1	
<b>\$396</b>	
Websearch WIN .....	207083
Websearch MAC .....	189900

**Extensis Suitcase X1 for Mac OS X**

With unmatched font preview options, auto-activation, corrupt font detection and repair, duplicate font management and more. An integral part of the creative workflow.

- Academic (211119) **\$99**
- Upgrade (211120) **\$85**

Mac OS X Compatible



Full	
<b>\$155</b>	
Websearch Code .....	211070

**Extensis Photo Imaging Suite**

A collection of image and workflow-enhancement tools for the professional and aspiring photographer. The Suite enables today's photographers to digitally catalog and distribute their work, as well as quickly and intuitively scale, mask, enhance and add border effects to images in Adobe Photoshop.



Photo Imaging Suite	
<b>\$739</b>	
Websearch Code .....	211437

**NEW**

Subscription	
<b>\$460</b>	
Websearch Code .....	223745

**QuickBooks Premier 2004**

Powerful 5 User Accounting.

QuickBooks Premier for up to 5 users includes comprehensive tools to meet your specialised needs. Premier includes versions for accountants, contractors, manufacturers & wholesalers, not for profit organisations, professional organisations, retailers or property managers

**Features for 2004 include:**

- Share data among 5 simultaneous users - Allows up to five users to work on a QuickBooks company file at the same time
- Built specifically for your industry - QuickBooks is now available in many new industry-specific editions that offer specialised tools and features unique to your industry
- Multi Currency Accounting
- Increase efficiency with advanced tools - Save time and costs by emailing invoices, statements, estimates, purchase orders, sales orders, sales receipts, adjustment notes, and reports
- Complete control over your payroll - Calculate earnings, deductions, and payroll taxes from within QuickBooks
- Integrates seamlessly with Microsoft Office

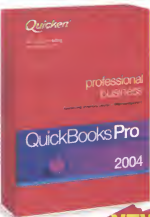
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**5 User**+  
\*12 months support  
see pack for details

\*12 Months free support applies to full versions of QuickBooks Premier 2004 only

Upgrade	
<b>\$615</b>	
Websearch Code .....	223676

Full	
<b>\$1295</b>	
Websearch Code .....	223675

**NEW**

Subscription	
<b>\$230</b>	
Websearch Code .....	223704

**QuickBooks Pro 2004**

Accounting, Inventory, Payroll and Time Management.

QuickBooks Pro lets you prepare quotes & estimates, integrates seamlessly with Microsoft Office and has advanced tools to help your increase efficiency and accuracy

**Features for 2004 include:**

- Fully integrated Payroll contained wholly within QuickBooks
- Track Stock Assembly (finished goods)
- Units of Measure
- Sales order / back order tracking
- Multiple Quotes per job
- Variance tracking on Quotes
- Multi Currency Accounting
- Enhanced Electronic Banking\*
- New bank reconciliation control allows you to reprint by any bank record date
- Single User, and much more...

\*Check with your financial institution to see if they support this feature

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Integrates with  
Microsoft Office  
+  
\*12 months support  
see pack for details

\*12 Months free support applies to full versions of QuickBooks Pro 2004 only

Upgrade	
<b>\$289</b>	
Websearch Code .....	223677

Full	
<b>\$525</b>	
Websearch Code .....	223672

**NEW**

Subscription	
<b>\$185</b>	
Websearch Code .....	223679

**QuickBooks Plus 2004**

Accounting, Inventory + Payroll Management

QuickBooks Plus 2004 Small Business + Payroll accounting tools for a business with employees.

**Features for 2004 include:**

- Fully integrated Payroll. Contained wholly within QuickBooks
- Print pay slips and cheques directly from QuickBooks Plus - now with improved layouts
- Electronic direct deposit of pay cheques
- Detailed reports and Payment Summaries
- Take care of all your Payroll and financial information in the one program
- Customisable - change the interface to the way you want it
- Single User

And much more...

Go to [www.csw.com.au/quickbooks.asp](http://www.csw.com.au/quickbooks.asp) to view red hot Quicken deals and prices!

Includes  
payroll

Upgrade	
<b>\$229</b>	
Websearch Code .....	223678

Full	
<b>\$359</b>	
Websearch Code .....	223671





**NEW**

### QuickBooks Lite 2004

QuickBooks Lite 2004 is for you if you need an accounting solution that covers the essentials.

- Fast and easy start up
- Create invoices with one click
- Write and print cheques
- Track customer payments, expenses and liabilities

#### Features for 2004 include:

- Advanced options for backing up your data
- Automatically create a budget
- More form customisation options
- Download bank statements to QuickBooks\*
- Single User

And much more...

\*check with your financial institution to see if they support this feature

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Stock  
at this  
special price!**

Go to [www.csw.com.au/quickbooks.asp](http://www.csw.com.au/quickbooks.asp) to view red hot Quicken deals and prices!

Full	<b>\$99</b>
Websearch Code 223670	



**NEW**

### QuickBooks Customer Manager

Centralise all your customer data into one system

Customer Manager is a new information and task management tool that will help you better serve your customers. It takes the pain out of tracking customer information in multiple systems because it consolidates all your client's critical information in one place and displays it on one, simple screen. When you click on a customer's name a complete overview of her customer interactions instantly appears: emails, phone calls, contact information, correspondence, recent QuickBooks transactions, linked documents, notes, to-do's, project information, and related contacts (like referrals or family members).

#### Features for 2004 include:

- Centralise all your customer data into one system
- Enhances customer service
- Simple to get started
- Manage projects efficiently
- Multi user synchronisation
- Shares data with Microsoft Outlook and QuickBooks 2004, and integrates with Word and Excel

**Effective  
Customer  
Management**

Go to [www.csw.com.au/quickbooks.asp](http://www.csw.com.au/quickbooks.asp) to view red hot Quicken deals and prices!

Full	<b>\$249</b>
Websearch Code 224957	



**NEW**

### QuickBooks Payroll Premier

The complete Remuneration Management solution for your small or medium business

Premier 2004 makes payroll quicken easy giving you more time to manage your business. The best selling stand alone payroll software in Australia is designed to keep you up to date, compliant with the latest legislation, and grows as your business needs to grow.

#### Features for 2004 include:

- Updated 2004-2005 payroll tax tables from the 2004 budget
- New single page summary form
- Enhanced search functionality
- Automated check of Tax File numbers

**Easy  
Payroll  
Management**

Go to [www.csw.com.au/quickbooks.asp](http://www.csw.com.au/quickbooks.asp) to view red hot Quicken deals and prices!

Full	<b>\$464</b>
Websearch Code 225107	

### Mannacom Publish PDF

Save virtually any document (from MS Word to complex graphs) in the popular Portable Document Format (PDF). A PDF file preserves the format of the original document, and contains all the original fonts, images & graphic information, layout and formatting – so what you see is exactly what everyone else sees. A PDF file can be viewed and printed from any computer running almost any operating system.



<b>\$88</b>
Websearch Code 210633

### Mannacom Publish PDF Pro

PublishPDF Pro has all the excellent features of the standard PublishPDF, but has extra security features to make it more suitable for sensitive information. Document security is increasingly important for companies the world over. PDF files, like other file formats, can be edited unless they are protected by encryption. Also included in PublishPDF Pro are other advanced features such as bookmarks and URL links.



<b>\$175</b>
Websearch Code 210634

### Dantz Retrospect Pro

Retrospect protects against loss due to viruses, newly installed software, user error, damaged hardware, hardware upgrades, hackers, and lost or stolen computers.

- Small Business Server (197430) \$1285



<b>\$219</b>
Websearch Code 197109





**StarOffice 7****By Sun Microsystems**

Runs on Solaris, Linux and Windows. Read, write and edit Microsoft Office files. Applications include word processing, spreadsheets, presentations, database, publishing and graphics, web browsing and photo editing.

**\$149**

Websearch Code ..... 225214

**Encyclopaedia Britannica 2004 Ultimate Reference Suite**

With more than 100,000 articles, the Ultimate Reference Suite has more content than any other reference software! Three complete encyclopedias, two dictionaries and thesauruses, rich multimedia, a complete atlas, timelines, online magazines and more.

- Student (210960) \$42
- Deluxe (210959) \$73
- Ultimate Reference DVD (210962) \$110

**\$110**

Websearch Code ..... 219961

**Ipswitch WS FTP PRO**

WS FTP Pro is the market leader in Windows-based FTP (File transfer protocol) client software. It enables users to move files between local and remote systems.

- Upload Wizard
- Auto Resume
- Custom Firewall Support with Editing Capability

**\$88**

Websearch Code ..... 196493

**MYOB BusinessBasics**

No need to jump between programs (such as spreadsheets and word processors) to get your business done. Now with MYOB BusinessBasics, you can run all your basic business tasks, create quotes, email invoices and enter transactions - from the one easy business program.

MYOB BusinessBasics is ideal for small or home-based businesses, offering you a number of significant time-saving features that make business management even easier, such as:

- Automated bank reconciliation
- An easy-entry transaction register

**\$151**

Websearch Code ..... 213762

**MYOB Accounting Plus 14**

MYOB Accounting Plus is for businesses that need to streamline accounts procedures and would benefit from improved inventory management, better management of customer and supplier relationships, advanced business reporting and automated payroll or time billing.

**\$471**

Websearch Code ..... 223825

**\$259**

Websearch Code ..... 223833

**MYOB FirstEdge - for Mac**

MYOB FirstEdge is the basic business management software solution for small or home-based businesses using a Mac, that helps you to work faster and more efficiently.

- Create quotes that convert to invoices
- Track job costings and profitability
- Track your GST and automate your BAS
- Create and customise over 70 reports
- Email quotes, invoices and reports

**\$165**

Websearch Code ..... 194241

**MYOB RetailManager Standard**

The complete retail picture. With MYOB RetailManager Standard it is easy to keep track of every transaction in your store from sales, stock movements, GST and gross profit, right through to staff actions and even customer details.

- Process sales fast
- Build powerful customer relationships
- Produce reports at point-of-sale
- Streamline your stocktaking
- Manage your stock

- Retail Manager Pro (192166) \$2175

**\$1735**

Websearch Code ..... 210853

**MYOB Accounting 14**

MYOB Accounting is for businesses that need to streamline accounts procedures and would benefit from improved inventory management, better management of customer and supplier relationships and advanced business reporting.

- Streamline accounts procedures
- Comprehensive business management
- Powerful inventory management
- Contact management

Full Version  
Websearch Code ..... 223824**\$235**Upgrade  
Websearch Code ..... 223826**\$215****MYOB Premier 8**

MYOB Premier is for businesses that need to streamline accounts procedures, whether through simplifying complex inventory issues, running an automated payroll, time billing, accessing advanced reporting or increasing productivity with multi-user access. MYOB Premier's combination of productivity enhancing features will appeal to any business that has complex inventory requirements. Works with more than one currency, or requires multi-user access. Also includes 1 full year of MYOB Support Licence.

**\$1333**

Websearch Code ..... 223823

**MYOB AccountEdge 4**

MYOB AccountEdge is the ideal accounting and business management software solution for businesses using a Mac.

- Maintain accurate accounts
- Process sales and purchases
- Track your inventory and your money
- Process your payroll
- Track your billable time
- Build better customer and supplier relationships

**\$519**

Websearch Code ..... 223834

**MYOB Pocket Accounts**

MYOB PocketAccounts, a handheld sales and time billing program that helps businesses with a mobile sales or consulting force improve their efficiency and cash flow.

MYOB PocketAccounts runs on a Palm OS device and links seamlessly with MYOB accounting software on the desktop, allowing users to synchronise their entire day's data at the push of a button.

**\$185**

Websearch Code ..... 212481

## Neoteck nbsPOS - Point of Sale solution

Neoteck Business Solutions bring you Australia's most affordable SQL based Point of Sale solution. nbsPOS is a powerful and easy to use point of sale solution for small single register businesses to large, multi-site organisations. With optional modules for pharmacy, hospitality and hiring, nbsPOS provides a complete retail solution.

### FEATURES

- Easy Searching Of Customers, Stock & Suppliers
- Includes Smart Card reader/writer
- User Definable Toolbars & Shortcut Keys
- SQL Database
- Multiple Barcodes for each Product
- Lay-Bys & Gift Certificates
- Comprehensive Discount Options
- Comprehensive & customisable security features
- Stand-alone Customer Loyalty program
- Detailed Reporting & Audit Trails
- Kits & Serial Number Tracking
- Process Multiple Sales
- Split Tenders & Multiple Tender Methods

### SUPPORTED PERIPHERALS

nbsPOS is compatible with most computer based point of sale hardware, including:

- Touch Screens
- Barcode Scanners
- Strip Printers
- Electronic Cash Drawers
- Customer Pole Displays
- Programmable Keyboards
- EFTPOS Terminals

### OPTIONAL EXTRAS

nbsPOS is easily upgraded from the standard single user version. nbsPOS may be simply upgraded to the multi-user nbsPOS for enterprise by simply purchasing the additional user licenses.

Optional add-on modules include:

nbsPOS for Pharmacy

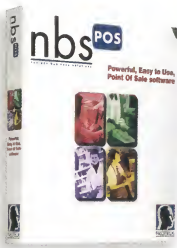
With a real-time link to FRED pharmacy dispensary and standard hire functionality included. nbsHOST

The hospitality management solution allows you to manage your restaurant's tables, menus, meal orders, functions and sales.

nbsHIRE

The hire management system has been design specifically to suit the needs of any business that needs to hire out items.

Contact Neoteck Business Solutions at [www.neoteck.com.au](http://www.neoteck.com.au) for more information on these optional extras.



Websearch Code 227055 **\$995**

## Crystal Reports 10 Standard Edition

Designed for access to data stored in personal data sources and the creation of highly formatted reports, Crystal Reports 10 Standard is an intuitive solution that provides basic report design functionality off PC-based data sources.

### Professional Edition

Designed for the creation and maintenance of highly formatted reports, Crystal Reports 10 Professional is a high productivity solution that includes all features in the Standard Edition plus access to almost any enterprise data source. An introductory offer of Crystal Enterprise Express Edition is also included for out-of-the-box web report delivery to workgroups.

### Developer Edition

Designed for easily integrating report viewing, printing and exporting capabilities into applications, Crystal Reports 10 Developer provides both report design and developer tools for integrating reports into applications

### Advanced Developer Edition

Designed for formatting and integrating interactive data within web applications, Crystal Reports 10 Advanced Developer offers a web development and deployment bundle for integrating and deploying dynamic report creation and viewing capabilities into web applications. It includes the complete Crystal Reports feature set and an introductory offer of Crystal Enterprise Embedded Edition for offloaded report processing and runtime report creation.

## Crystal Analysis 10

Crystal Analysis 10 continues to empower users of all abilities to better analyse corporate data. Through its intuitive design environment, Crystal Analysis delivers guided analysis enabling employees, customers, and suppliers to gain insight into business data and make intelligent decisions to impact corporate performance.

- Developer Upgrade (214409) \$363
- Advanced Developer Upgrade (214475) \$1895
- Professional Upgrade (214477) \$289
- Analysis Professional Upgrade (222139) \$275



Analysis Professional	Standard Edition	Professional Edition	Developer Edition	Advanced Developer Edition
<b>\$515</b>	<b>\$225</b>	<b>\$559</b>	<b>\$685</b>	<b>\$2199</b>
Websearch Code 222138	Websearch Code 214478	Websearch Code 214286	Websearch Code 214476	Websearch Code 214474

## WinZip 9

The archive utility for Windows and the ultimate companion for Internet downloading. Zipping safely compresses the data in your files, so that your files then occupy less space, allowing you send and save more! Multi-user licenses available.



Picture for illustration purposes only

**\$79**  
Websearch Code 223038

## Microsoft Flight Simulator 2004

A Century of Flight celebrates the first 100 years of powered flight with a collection of important historical aircraft and exciting new features that continue the traditions of realism, technological innovation, and richness that have delighted aviation enthusiasts and pilots around the world.

- Flight Simulator 3 \$64



**\$88**  
Websearch Code 197573

## Executive Software Diskeeper 8.0

Maximize and maintain system performance automatically. The only way to maximise system speed is to eliminate fragmentation entirely - something that a manual defragmenter simply can not do.

- Home Edition (210358) \$65



Professional Edition
<b>\$119</b>
Websearch 210359

## Manufacturing Series

- Autodesk Inventor
- Autodesk Mechanical Desktop
- AutoCAD (included as part of AutoCAD Mechanical)


**\$242**

Websearch Code ..... 222078

## Building Series

- Autodesk Architectural Desktop
- AutoCAD (included as part of Autodesk Architectural Desktop)


**\$242**

Websearch Code ..... 224116

## Revit Series

- Autodesk Revit
- AutoCAD


**\$242**

Websearch Code ..... 246306

AutoCAD and Autodesk VIZ also available separately.

## Autodesk AutoCAD LT 2005

Efficient, Secure, Affordable 2D CAD Software

AutoCAD LT 2005 is the affordable 2D CAD software that helps you create, plot, publish and share your 2D designs. You can quickly create tables, better manage large groups of layers and conveniently access frequently used content to work more efficiently. Sharing your data widely is a snap: even team members without AutoCAD LT software can view and mark up your published DWF files and you can instantly distribute multiple DWG files in a single step. Plus background plotting frees you to work while you print out your drawings. AutoCAD LT 2005 provides full DWG compatibility with AutoCAD 2005.


**\$1975**

Websearch Code ..... 222068

**\$645**

Websearch Code ..... 222069

## Autodesk AutoSketch 8

An affordable and easy-to-use precision drawing tool for new or occasional CAD users who need to create conceptual drawings and sketches. It provides productivity and ease of use features not found in other low cost precision drawing programs. From concept sketches, information graphics and floor layouts to presentations, electrical drawings and home project plans, you can draw it all - quickly and accurately.


**\$215**

Websearch Code ..... 109590

## Autodesk Volo View 3

Using Volo View 3, team members can view, mark up, measure, print, and plot AutoCAD 2004, Autodesk Inventor 7, and raster formats as well as DWF (Design Web Format) files without having the original design creation software. The files display and print exactly as the document creator intended—with rich design information, such as layers, views, and measurements.


**\$299**

Websearch Code ..... 208826

## Autodesk QuickCAD 8

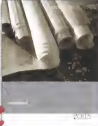
QuickCad is the most affordable design program that Autodesk offers, but its low price doesn't diminish its capabilities. It comes with plenty of productivity features that let you make technical designs and diagrams. With its short learning curve, QuickCAD lets you start drawing right away by offering a simple beginner interface, then as you grow familiar with its capabilities, you can change to advanced or expert levels.


**\$135**

Websearch Code ..... 109591

## Autodesk Raster Design 2005

Now you can easily use and reuse existing design data in scanned maps, drawings, aerial photographs, and satellite imagery. Autodesk Raster Design 2005, the editing and image-processing tool that works inside your AutoCAD software-based application, can save hours of drawing time by converting raster to vector and combining drawings with real-world imagery. Upgrades also available.


**\$2633**

Websearch Code ..... 246230

## Autodesk AutoCAD 2005

Faster Data Creation, Easier Data Sharing

Creating a single drawing as efficiently as possible is important. Delivering a coordinated set of drawings in a timely manner directly benefits your bottom line. With AutoCAD 2005 you can do both. Everyday tools like the table object and tool palettes boost productivity, and the new Sheet Set Manager helps you control content across entire sets of related drawings, enabling you to lower the risk for errors. Then, in a single view, you can compose and collate sheet sets and share them with your project team using plots, eTransmit, or DWF (Design Web Format) files.


**\$5989**

Websearch Code ..... 222070

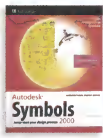
**\$849**

Websearch Code ..... 222071

## Autodesk Symbols 2000

Autodesk Symbols 2000 simplifies routine drawing tasks and boosts productivity through a toolbar-style graphical interface, which guides you rapidly through a wide selection of technically correct symbols. With a click of the mouse symbols are placed easily and exactly where they are needed.

Architectural Series contains over 5,600 symbols for building design and documentation. Engineering Series containing over 10,800 symbols covering all aspects of Engineering.


**\$189**

Architectural/Engineering Websearch ..... 130131/130331

## Autodesk Viz 2005

Award-winning Autodesk VIZ provides a fluid 3D environment for modelling, rendering and animation. Whether you're an architect, land planner or mechanical designer, you can use Autodesk VIZ throughout the design process to develop and explore concepts and alternatives, communicate design intent to clients and validate your design to ensure they are error free. Autodesk VIZ, a multimedia software tool that brings your designs alive. Upgrades also available.


**\$3291**

Websearch Code ..... 246305

**FileMaker Pro 7**

Simply the best way to manage your data

FileMaker Pro 7 is the easiest-to-use, most customisable database software that effortlessly manages all your information. Gain insights into your business so you can make more informed decisions and enhance productivity.

With over 100 new and improved features, you can turn your ideas into creative and customised solutions, tailor them to solve your specific business problems and share them securely with your whole workgroup.

**FileMaker Pro 7's enhanced productivity tools allow you to:**

- Organise all your data: PDFs, images, video, presentations, Excel and Word documents.
- Develop document management systems to track and archive workgroup data.
- Solve problems immediately with 30 free starter solutions for business, education and home.
- Create fully relational database solutions quickly.
- Link your data with the new intuitive relationships graph.
- Exchange data with Microsoft Office and many other applications.
- Develop and distribute secure business solutions over your networks or through single-click Web publishing.
- Control access through a unified accounts and privileges security model.

# 1-selling  
easy-to-use  
database just  
got better!**New features include:**

- Store ANY file type in FileMaker Pro 7
- Visual tool for managing relationships
- Multiple views in different windows
- New security model - Data protection
- Multiple tables per file
- Improved Instant Web Publishing

**SPECIAL UPGRADE OFFER!**For a limited time, **ALL** customers who own a licence of FileMaker Pro 2.1, 3.0, 4.x, 5.x and 6 can upgrade to FileMaker Pro 7 until 17/9/2004\*\*

\*The FileMaker 7 product family does not work with earlier versions of FileMaker products.  
\*\*Offer expires on 17/9/2004 for FileMaker Pro 2.1, 3.0, 4.x, and 5.x licensed users.  
Go to [www.filemaker.com/au/upgrade](http://www.filemaker.com/au/upgrade) for more information.

Full	Upgrade	SUser	SUser Upgrade	Academic	SUser Academic
<b>\$458</b>	<b>\$229</b>	<b>\$2249</b>	<b>\$1099</b>	<b>\$239</b>	<b>\$1149</b>
Websearch Code - 222365	Websearch Code - 222366	Websearch Code - 222369	Websearch Code - 222370	Websearch Code - 222562	Websearch Code - 222405

**FileMaker Server 7**

FileMaker Server 7 is high-performance server software that efficiently manages shared database solutions.

With ease of use breakthroughs in sharing and administration, as well as advanced security options, FileMaker Server 7 delivers powerful, yet easy to use features you can use to:

- Share databases with up to 250 users
- Host virtually unlimited amounts of data
- Administer databases centrally or remotely
- Improve the performance of shared databases
- Protect your data with advanced security features.
- Upgrade (224954) **\$849**
- Academic (224962) **\$849**

**\$1549**

Websearch Code - 224952

**FileMaker Mobile 7**

FileMaker Mobile 7 is a simplified version of FileMaker Pro, designed specifically for Palm OS and Pocket PC handhelds, so you can easily extend your FileMaker solutions beyond your desktop to mobile individuals and workgroups.

With its ability to transfer just the data you want to one or more handhelds from a single desktop, flexible data entry and viewing features, and two-way synchronisation, FileMaker Mobile provides everything you need to:

- Have information at your fingertips
- Easily gather information while on the go
- Keep your desktop and handheld databases in sync
- Create mobile workgroup solutions

**\$109**

Websearch Code - 224953

**Centennial Media Training for FileMaker Pro 7**

These new CD sets provide thorough and comprehensive training into the principles and features of FileMaker Pro 7. Proceed step by step with easy to understand methods and techniques.

**Call for Pricing****TypeSmart**

Already well known in Australian education circles in its earlier incarnation as eText, TypeSmart is a genuine breakthrough in typing technology. Incorporating the latest insights into Accelerated Learning and taking into account research into electronic keyboard use, as distinct from old-fashioned typewriters, TypeSmart can take beginner or "hunt and peck" typists to 10 finger touch typing in just 6 hours.

TypeSmart justifies its tagline "Breakthrough Typing Tutor" by dispensing with the outdated Home Keys method and introducing the eText Direct Reach Method recommended by the latest research into modern typing. It is the only typing software to do so and is now established in many of Australia's leading private schools. Australia's largest provider of distance learning, Deakin University, and is now being actively promoted into the TAFE and training environments.

**\$75**

Websearch Code - 210189



# Internet Security & Problem Solving Australia's Software Specialist

AUGUST/SEPTEMBER 2004

## Symantec FireWall VPN Appliance

Model 100 - 4 Lan and 1 Wan Ports  
Provides plug and play networking, web access, and firewall and VPN security for up to 25 users.  
(189887) \$475

Model 200 - 8 Lan and 2 Wan Ports  
Brings Firewall and VPN protection, load balancing, and high availability to offices with up to 40 users  
RentSmart \$6.57 p/wk (189888) \$599

Model 200R - 8 Lan and 2 Wan Ports  
Brings Firewall and VPN protection, load balancing, and high availability to offices with up to 40 users. Also includes the Symantec VPN Client (with integrated personal firewall).  
RentSmart \$8.44 p/wk (189889) \$770



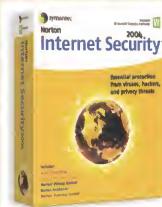
## Symantec System Gateway Security 300 Series

The Symantec Gateway Security 300 Series is high-performance, low-maintenance firewall appliance for small businesses. It combines comprehensive security, a reliable Internet gateway, and a secure wireless LAN option in one affordable solution. Its intuitive installation wizard and exclusive LiveUpdate technology make setup and maintenance a breeze, while its licensing options eliminate the hassle and cost of monthly subscription charges.

**Powerful  
firewall  
protection for  
your business  
network**



**Call for Pricing**



## Norton AntiVirus 2004

Symantec's Norton AntiVirus 2004 is the world's most trusted antivirus solution. It protects email, instant messages, and other files by automatically removing viruses, worms and Trojan horses. New built-in features also detect certain non-virus threats such as spyware and keystroke loggers. Protect your PC 24 hours a day with award-winning Norton AntiVirus.

- 5 User Pack (210226) \$222
- 10 User Pack (210228) \$429
- 1 User Academic (210234) \$52



**\$77**

Websearch Code ..... 210225

## Norton SystemWorks 2004

The smartest way to solve computer problems. This easy-to-use suite includes full versions of Symantec's products to defend against viruses, optimise hard disks, manage your passwords, recover from system problems and clean up after Internet sessions. Keep your PC running at its best with Norton SystemWorks.

- Academic (210247) \$76



**\$117**

Websearch Code ..... 210638

## Symantec AntiVirus 9.0 Business Packs

Provide powerful, easy-to-manage protection - automatically removing viruses, worms, and Trojan horses from your desktops and network servers, delivering timely updates, and defending your business against known and emerging threats.

- 10 User (246368) \$735
- 5 User with Groupware (246379) \$549



**\$399**

Websearch Code ..... 227028

## Norton Internet Security 2004

Symantec's Norton Internet Security 2004 provides essential protection from viruses, hackers, and privacy threats. Powerful yet easy to use, this award-winning suite now includes advanced spam-fighting software to filter unwanted mail out of your inbox. Protect yourself, your family, and your PC online with Norton Internet Security 2004.

**Norton Internet Security 2004 includes:**

- Norton AntiVirus
- Norton Personal Firewall
- Norton Privacy Control
- Norton AntiSpam
- Norton Parental Control
- Academic (210248) \$77
- Norton Internet Security 2004 (210637) \$138
- Norton Internet Security 5 User (210648) \$339



**\*\$30 MAIL-IN UPGRADE REBATE OFFER!**

For previous owners of Symantec's Norton retail packaged product or pre-loaded (OEM) or downloaded full version Symantec software. Proof of previous ownership is required. Please retain your sales receipt to submit rebate request. Offer only applies to full version retail packaged purchases of Norton Internet Security 2004. Offer is not valid in conjunction with any other rebate offer. Offer ends 31/12/2004. See box for details.

Websearch Code ..... 210636

**\$118**

## Norton AntiSpam 2004

Symantec's Norton AntiSpam 2004 filters unwanted email out of your inbox. Working with any POP3 email program, it filters incoming mail on multiple levels, detecting and flagging unsolicited messages while promptly delivering valid mail. To make your online time more enjoyable, Norton AntiSpam also blocks intrusive pop-up and banner ads.

- 5 User (210650) \$183
- 10 User (210652) \$359
- Academic (210653) \$44



**\$63**

Websearch Code ..... 210645

## Norton Personal Firewall 2004

Symantec's Norton Personal Firewall 2004 keeps hackers out and personal data in. It makes robust firewall protection easy by automatically hiding your PC on the Internet and blocking suspicious connections. Norton Personal Firewall also protects your privacy by preventing confidential information from being sent out without your knowledge.

- 5 User Pack (210515) \$225
- 10 User Pack (210524) \$444
- Academic (210544) \$52



**\$77**

Websearch Code ..... 210644

## Norton SystemWorks Pro 2004

Symantec's Norton SystemWorks 2004 Professional Edition provides advanced problem-solving solutions to maximize PC performance. Includes award-winning Symantec products and valuable additional utilities to protect your PC from viruses, optimise performance, diagnose and fix problems and recover from disasters.

- 5 User Pro (210649) \$345
- 10 User Pro (210655) \$677
- Academic (210248) \$90



**\$137**

Websearch Code ..... 210646

## Norton Password Manager 2004

Norton Password Manager records user names, passwords, credit card numbers, and other confidential information into an encrypted file that only you can access. Then it automatically offers to insert the appropriate data whenever you run a password-protected application (such as your email program) or visit a secure Web site.

- Academic (210515) \$40



**\$62**

Websearch Code ..... 210647

## Symantec Client Security 2.0 Business Packs

Provide powerful, multi-layer security in one easy-to-manage solution. With Symantec Client Security, your business, you can count on up-to-date protection against viruses, hackers, and blended threats, along with world-class support. Cutting-edge firewall protection and intrusion detection automatically hide your desktops and block suspicious connections.

- 10 User (246479) \$919
- 5 User with Groupware (246477) \$629



**\$497**

Websearch Code ..... 240480



## Zone Alarm Pro 4

Millions of users trust their computers to Zone Labs Firewall. The award-winning personal firewall provides home users and small business owners with the highest level of protection possible. ZoneAlarm Pro blocks known and most unknown internet threats and provides privacy features, such as intrusive cookie control and the ability to block annoying ads. With ZoneAlarm Pro, whenever you are connected, you are protected.

- 5 user license (211468) \$299



**\$77**

Websearch Code ..... 212740

## Trend Micro Internet Security 2004

PC-cillin - has now graduated into the best all-round Internet Security solution available! Trend Micro Damage Cleanup Services are triggered as soon as a virus is caught to keep your system functioning properly. Includes total security against viruses, spam, hackers and worm viruses (full featured Firewall), and spyware. Provide security for your children (Parental Control) and for your PDA.

- Anti Virus
- Personal Firewall
- Protection for PDA
- NEW Anti Spam
- NEW Parental Controls
- NEW Privacy Protection
- NEW Spyware removal
- Academic (212711) \$62
- 5 user license (213397) \$249



**\$99**

Websearch Code ..... 223002

Single User

**\$81**

Websearch Code ..... 211906

## McAfee VirusScan 2004

McAfee VirusScan 2004 is an easy-to-use antivirus solution that ensures your PC is protected from viruses, worms, Trojans, spyware, web dialers and other malicious threats. McAfee VirusScan 2004 stops threats coming from email, instant messaging, internet downloads, shared files and more.

- VirusScan Pro (223640) \$83



**\$66**

Websearch Code ..... 209471

## McAfee Personal Firewall Plus 2004

Secure your PC's connection to the Internet whether you connect via DSL, cable modem or dial-up. With intrusion prevention, color coded security alerts, customisable audible alerts, detailed logging and an application scan for internet enabled applications, McAfee Personal Firewall Plus 2004 gives you the power you need to control the communications into and out of your PC.



**\$39**

Websearch Code ..... 209425

## McAfee Internet Security Suite 2004

Destroys viruses, outwits hackers, secures your personal information, prioritises your Web browsing, blocks ads and pop ups, manages your cookies and passwords, locks down your files, folders and drives, filters objectionable content and more.



**\$99**

Websearch Code ..... 223055

## ACT! 6

The best selling contact manager. Manage Information in ACT!—then have it appear in Microsoft Outlook, Palm OS or Pocket PC handhelds on the Web, or in your paper planner. That's the power of ACT!—the ONE place where you can manage every detail of your customer relationship.

- Schedule unlimited calls, meetings and to-do items.
- Create and send personalised letters, faxes, and HTML e-mails.
- Manage your sales pipeline with forecasting tools and built-in reports.
- Share complete customer information with other staff members in your office.
- Easily synchronise your information to your Palm OS or Pocket PC\* device.
- Integrates with popular accounting software\* such as MYOB Accounting, QuickBooks and Sage Line 50/100
- Integrates with Microsoft Word and Excel and Outlook

\* Pocket PC and Accounting Integration software sold separately.



**Buy ACT! 6 now and get the next version FREE!\***

ACT! Single User

**\$229**

Websearch Code ..... 191976

ACT! 6 Pack

**\$1175**

Websearch Code ..... 191974

## ACT! 6.0, Palm OS and Pocket PC Bonus Pack

The latest product to hit the ACT! product range is the ACT!, Palm OS and Pocket PC Bonus Pack:

- Now you can by ACT!, ACT! for Palm OS and the ACT! Link for Pocket PC all in one package
- ACT! v6.0 - the best-selling, user friendly contact manager on the market!
- ACT! for Palm OS - Have complete customer information with you on-the-go. ACT! for Palm OS is the first-ever, complete contact for Palm OS handhelds.
- ACT! Link for Pocket PC - synchronise your contacts and appointments to your Pocket PC handheld.

- ACT! 6.0, Palm OS (194991) \$69



**\$249**

Websearch Code ..... 224402

## ACT! For Web

ACT! also has a web version that is powerful and easy-to-use. ACT! for Web is a contact manager for the web, designed for corporate users and workgroups.

- Remote ACT! for Web users can share realtime information with other users back in the office.
- Administrators can easily customise database screens without programming or HTML and assign specific security rights to individual users.



ACT! For Web

**\$299**

Websearch Code ..... 205441

## Vet Net Surfer Anti-Virus

Do not leave virus protection to chance - purchase Vet Net Surfer now to automatically protect your PC from viruses, worms and Trojans, including those arriving via email. Vet customers receive free unlimited phone and email support, as well as daily Virus Updates and free new versions - all for one year! All the anti-virus you need.

- Now automatically checks incoming email for viruses
- Suitable for a single home or business PC
- 100% made and supported in Australia
- Academic (223109) \$39



**\$75**

Websearch Code ..... 223114

## Vet Enterprise Anti-Virus

Do not leave your business unprotected from viruses, worms or Trojans - purchase Vet Enterprise - small business edition now to protect 2, 5, 10 or 25 PCs. Install and update across networked PCs for maximum protection. And Vet customers receive free unlimited phone and email support, as well as daily Virus Updates and free new versions - all for one year!

- 100% made and supported in Australia
- 5 User (223046) \$285
- 10 User (223081) \$545
- 2 User Academic (223110) \$59



**\$125**

Websearch Code ..... 223080

## Norton AntiVirus Version 9 Mac

Works automatically in the background to find and remove viruses - without interrupting your work. It even detects viruses in email and internet files while they are being downloaded to your computer.

• Academic (197250) \$65



**\$99**

Websearch Code ..... 197242

## Norton Systemworks 3 Mac

Contains all the great programs including:

- Norton Antivirus
- Norton Utilities
- Dantz Retrospect Express Backup
- Aladdin Spring Clean
- Academic (197247) \$94



**\$151**

Websearch Code ..... 210044

## Norton Internet Security 3 Mac

The essential protection from viruses, hackers and privacy threats.

- Contains:
- Norton Antivirus
  - Norton Personal Firewall
  - Norton Privacy Control
  - Norton Parental Control
  - Aladdin iClean
  - Academic (197246) \$88



**\$135**

Websearch Code ..... 197245

## Corel WordPerfect Office 12

WordPerfect 12 delivers ultimate power and control over documents—allowing you to import and export MS Word files with enhanced ease and speed. Create professional-looking letters, articles, reports, proposals, books, legal pleadings, brochures and much more. In addition, WordPerfect 12 provides the advanced features and flexibility of HTML, Cascading Style Sheets (CSS), XML and PDF when publishing documents for distribution.

Quattro Pro 12: This powerful spreadsheet application lets you organize, analyze, report, manage and share important data and financial information.

Presentations 12: Presentations 12 provides the tools you need to produce slideshows, project proposals, interactive reports, interactive demonstrations, multimedia presentations, flyers, signs, banners, PDF files, Macromedia Flash files for animated Web presentations—and more.

New WordPerfect OfficeReady: WordPerfect OfficeReady lets you organize, preview and access WordPerfect Office 12 templates in one easy-to-use browser.

New WordPerfect Wireless Office Suite: Powered by ZIM, the WordPerfect Wireless Office Suite uses two-way SMS text messaging and mobile phones to keep you connected with your office anytime, anywhere.

Paradox: Available in WordPerfect Office 12 Professional and Education editions, Paradox is an easy-to-use relational database application that lets you store and retrieve data in a variety of ways.

• Academic (223657) \$159

Upgrade **\$239**  
Websearch Code ..... 223656

Full **\$449**  
Websearch Code ..... 223655

## CorelDRAW Graphics Suite 12

With new smart design tools, it's now easier and faster to produce more creative and accurate shapes and objects giving you a more powerful Windows graphics suite. Discover new and advanced features that increase productivity, such as real-time visual feedback.

- Full (227046) \$635
- Academic (213941) \$155



**\$275**

Upgrade  
Websearch Code ..... 213940

## CorelDRAW Essentials 2

A simple-to-use, all-in-one drawing application, with powerful photo enhancement tools and customisable template capabilities that allow you to create professional-looking projects with ease. You can produce sophisticated graphics, correct and enhance photos, lay out your project and publish it in a variety of print and Web formats.



**\$129**

Websearch Code ..... 224412

## Corel Photobook

Corel Photobook is the perfect companion for all your digital camera needs. Fast, fun and easy to use, it lets you retouch, organise and share your digital photos with the click of a mouse. Enhance your pictures, create personalised photo albums and organise your photos more easily than you ever imagined. Plus, print photos, publish them to the Web, create slide shows or e-mail them to friends and family. Corel Photobook—perfect digital photos made easy!



**\$66**

Websearch Code ..... 192944

## Corel Print House 6

A comprehensive and easy-to-use home publishing suite that lets you create fun print projects quickly, easily and with a high degree of creativity, including scrapbooks, greeting cards, calendars, banners, paper toys, invitations and more. A complete publishing package at your fingertips, with an enormous selection of and drawing tools, ready made sample projects and graphics, and simple features that make it easier than ever to publish your projects on the Web, or e-mail them to friends and family.



**\$66**

Websearch Code ..... 192402

## Corel R.A.V.E. 2

Based on award-winning CorelDRAW technology, Corel R.A.V.E. 2 gives first-time or novice animators the power to create, customize and add Web animations quickly and simply. Intuitive, adaptable and easy-to-use, Corel R.A.V.E. 2 gives you all the capabilities you need, without any of the complications you don't.



**\$66**

Websearch Code ..... 192403

## WordPerfect Family Pack 5

Do more with your home computer than you ever thought possible, with WordPerfect Family Pack 5. Manage household finances. Create polished school reports, letters and recreational projects. Enhance your digital photos and share them on the Web.



**\$119**

Websearch Code ..... 209806

## Corel KPT Collection

The Corel KPT Collection of Kai's Power Tools plug-in filters gives professional designers an unprecedented set of creative tools. A natural addition to Adobe Photoshop, it dramatically extends the boundaries of image editing. KPT Fluid lets you create and animate a variety of distortions. KPT Ink Dropper creates liquids from water spots to smoky swirls. And KPT Lighting produces extremely realistic lighting effects. The whole collection makes a significant impact on your creativity and productivity.



**\$169**

Websearch Code ..... 196908

## Corel Bryce 5

Create 3D landscapes and animations with Corel Bryce 5. Striking an optimum balance between power and ease of use, this innovative software is an ideal way to integrate 3D technology into your creative process. Smooth network rendering saves valuable time by letting you render images on multiple computers. A new Light Lab gives you robust control over lighting direction, and the new Tree Lab ensures a more accurate depiction of real-world environments.



**\$129**

Websearch Code ..... 196909

## Corel Painter 8

Corel Painter 8 lets you experiment with the widest range of Natural Media tools available today. Expand your digital painting technique with a portfolio of new features, including a Mixing Palette that realistically mimics the traditional paint mixing experience, digital Watercolour and Sketch effect, more than 325 new brushes and a Brush Creator for limitless customisation.

- Upgrade (196513) \$235
- Academic (209941) \$168



**\$479**

Websearch Code ..... 196514

## Macromedia Studio MX 2004

Macromedia Studio MX 2004 integrates the leading professional tools for developing the full range of web sites and internet applications. Developers can build websites and applications with Dreamweaver, create interactive content with Flash, generate web graphics with Fireworks, and incorporate vector graphics with FreeHand.

The consistent user interface and seamless integration across the tools in Studio MX 2004 streamline web development workflow, enhancing productivity and ease-of-use. For developers delivering rich interactive applications, Studio MX 2004 is also available with Flash Professional.

- Academic (209282) \$275
- Upgrade from MX (210076) \$665
- Upgrade from any Macromedia product (210075) \$785



Full  
Websearch WIN/MAC... 209214 **\$1335**

## Macromedia Flash MX Pro 2004

Improved rich media support, streamlined publishing and robust new features to jumpstart development of highly interactive experiences plus advanced functions for creating data-driven applications, interactive content, professional quality video experiences, and deployment to mobile phones and devices. Macromedia Flash MX Pro is contained in Macromedia Studio MX 2004 Pro.

- Academic (209224) \$245
- Upgrade (210072) \$499
- Standard (209209) \$799
- Standard Upgrade (210070) \$319
- Standard Academic (209223) \$165



Full  
Websearch WIN/MAC... 210071 **\$1135**

## Macromedia Director MX 2004

The proven multimedia tool for building rich, interactive content and applications for CDs, DVDs, kiosks, and the Internet. Director MX 2004 handles the widest variety of media, letting you build compelling, high-performance content—such as learning applications, corporate demonstrations, and games—that delivers measurable results.

- Academic (222698) \$785
- Upgrade (214094) \$625



Full  
Websearch Code... 214093 **\$1875**

## Macromedia Freehand MX

Concept and design visually-rich graphics for print and web with Macromedia Freehand MX, the multi-publishing design solution with powerful illustration and drawing tools and an open, streamlined workflow.

- Upgrade from 10 \$169
- Upgrade from 9 \$249



Full  
Websearch WIN... 219579  
Websearch MAC... 219578 **\$599**

## Macromedia RoboDemo 5

RoboDemo records any on-screen activity to instantly create a Flash simulation, with visible and audible mouse clicks. Easily enhance simulations with text captions, audio, video, animations, click boxes, images and more. RoboDemo is a affordable simulation software that is SCORM/AICC compliant, and includes quizzing, scoring, branching and text-entry field features to develop truly effective simulations for your eLearning program.

With small file size and high resolution, simulations can easily be viewed on the Web or burned to CD for rapid delivery. RoboDemo also seamlessly integrates with Flash, giving you ultimate design and editing power.

- Upgrade (223748) \$489



Full  
Websearch Code... 223747 **\$789**

## Macromedia Dreamweaver MX 2004

Dreamweaver MX 2004 is the professional choice for building web sites and applications. It provides a powerful combination of visual layout tools, application development features, and code editing support, enabling developers and designers at every skill level to create visually appealing, standards-based sites and applications quickly. From leading support for CSS-based design to hand-coding features, Dreamweaver provides the tools professionals need in an integrated, streamlined environment. Developers can use Dreamweaver with the server technology of their choice to build powerful Internet applications that connect users to databases, web services, and legacy systems.

- Academic (210081) \$165
- Upgrade (210066) \$315



Full  
Websearch WIN/MAC... 209025 **\$649**

## Macromedia Fireworks MX 2004

Create, optimise and integrate great-looking web graphics. Fireworks MX 2004 provides professional control that enables easy creation of sophisticated rollover effects, multi-state buttons and pop-up menus. Fireworks MX 2004 streamlines productivity with enhanced performance and third-party web development tools.

- Academic (210082) \$165
- Upgrade (210068) \$249



Full  
Websearch WIN/MAC... 209020 **\$515**

## Macromedia Contribute 2

Update, add and publish content to existing websites without knowing HTML. Business users can quickly make content changes that respect existing website design, permissions, and code. This means less time spent updating web content while retaining control over their site.

- Academic (207911) \$129
- 5 User (207909) \$839
- 10 User (207910) \$1499



Full  
Websearch WIN/MAC... 207908 **\$235**

## Macromedia DevNet

DevNet Subscriptions give you the latest development software, Macromedia servers and productivity-enhancing resources, conveniently delivered online and on CD and all for a single annual fee.

- Professional (196231) \$1999



Essentials  
Websearch WIN... 196230 **\$485**

## Macromedia ColdFusion MX 6.1

Easy connectivity to enterprise data, built-in connectivity for Flash user interfaces, integrated search and charting, and complete support for XML and web services. ColdFusion MX provides everything you need to deliver powerful applications. Available in a configuration that supports industry leading application servers.

- Standard (209258) \$1650
- Standard Academic (209651) \$1039



Enterprise  
Websearch Code... 219650 **\$7250**

## Centennial Media Training CD-ROM's

Centennial Media provides the solution through interactive CD computer training of the highest standard that is also convenient, flexible and extremely cost-effective.



Dreamweaver MX 2004  
**\$363**  
Websearch Code... 213372

Fireworks MX 2004  
**\$297**  
Websearch Code... 213373

Flash MX 2004  
**\$297**  
Websearch Code... 213371

## QuarkXPress 6

Much more than a page layout tool, QuarkXPress 6 provides proven performance with graphics and colour management, text processing, Web-page design, XML, output and more!

- Supports Mac OS X v10.2, Windows 2000, and Windows XP
- Synchronise text for speed and accuracy - save time and reduce the number of data entry errors
- Create PDF files directly from QuarkXPress without having to buy third-party software.
- Upgrade from 4 \$1095
- Upgrade from 5 \$729



QuarkXPress 6.1  
Patch Now Available

Quark XPress 6  
**\$2449**  
Websearch WIN... 213306  
Websearch MAC... 213305

## Trellian eComm Store

With eComm, you can take orders 24 hours, 7 days a week, complete with secure order management and credit card processing (additional charges may apply). Secure online transactions and order management, build a detailed product database - images, freight, descriptions and more.


**\$44**

Websearch Code ..... 130908

## Trellian Jack the MP3 Ripper

An efficient ripping tool that enables the user to extract audio from a CD and export the music into either .mp3 or .wav format.

- Encodes to MP3 or WAV
- Full editing and saving of MP3 format Title/Artist/Trackname IDTAG information
- Requesting of Title/Artist/Trackname data over the Internet


**\$55**

Websearch Code ..... 190113

## Trellian SubmitWolf

Register your pages with over 1000 search engines and Directories in minutes. Post your links to over 500,000 link pages. Submit as many of your URLs as you like at no additional cost. 48 Hour, Priority Paid Submission on MSN, AOL, HotBot, GOTO, iWon, AltaVista, Slider.com and other sites part of the Intkomi network.


**\$125**

Websearch Code ..... 130095

## Adobe Creative Suite Standard & Premium

The Adobe Creative Suite (CS) is an integrated design environment that combines the most complete upgrade in Adobe's history - featuring full, new versions of the tools you rely on most for image editing, illustration, page layout, and cross-media output - with innovative Version Cue file-management features, a smooth Adobe Portable Document Format (PDF) workflow and comprehensive design resources. Create and publish content for print and the Web faster and more easily than ever before, all at an outstanding value. Adobe integration makes it possible. The Adobe Creative Suite makes it affordable.

### CS Standard Includes:

- Adobe Photoshop CS
- Adobe Illustrator CS
- Adobe InDesign CS
- PageMaker Plug-in Pack
  - Version Cue
  - Training CD



### CS Premium Includes:

- Adobe Photoshop CS
- Adobe Illustrator CS
- Adobe InDesign CS
- Adobe GoLive CS
- Adobe Acrobat Professional
- PageMaker Plug-in Pack
  - Version Cue
  - Training CD



Upgrade from Photoshop		<b>\$945</b>
Websearch WIN	222520	
Websearch MAC	222521	
Full		<b>\$1565</b>
Websearch WIN	222522	
Websearch MAC	222523	

Upgrade from Photoshop		<b>\$1225</b>
Websearch WIN	222524	
Websearch MAC	222525	
Full		<b>\$1885</b>
Websearch WIN	222526	
Websearch MAC	222528	

## Adobe Photoshop CS

Get superior results faster with industry-standard Adobe Photoshop CS and its integrated Web production application, Adobe ImageReady CS software. Graphic and Web designers, photographers, and video professionals can take advantage of indispensable features that include improved file management, new design possibilities, a more intuitive way to create for the Web, and support for 16-bit images, digital camera raw data, and non-square pixels. Now you can create the highest quality images more efficiently than ever before.

- Upgrade \$435
- Academic \$449



Full		<b>\$1075</b>
Websearch WIN	210744	
Websearch MAC	210743	

## Adobe Illustrator CS

Adobe Illustrator CS is an essential tool for anyone who needs to express ideas visually in print, on the Web, and in any other medium. Powerful new features, including 3D graphics effects, character and paragraph styles, and innovative text composition controls, deliver indispensable design options to help you explore your creative vision. And enhanced support for Adobe Portable Document Format (PDF), expanded print capabilities, faster performance, and tight integration with other Adobe products as well as Microsoft Office make it easier than ever to efficiently publish your artwork anywhere.

- Upgrade \$359
- Academic \$149



Full		<b>\$849</b>
Websearch WIN	210747	
Websearch MAC	210746	

## Adobe InDesign CS

Adobe InDesign combines extraordinary production power and creative freedom to take page design to a new level. With InDesign CS, you can produce pages quickly and output them reliably. Its intuitive creative toolset helps you refine design ideas rapidly. The ability to import native Photoshop, Illustrator and Adobe Portable Document Format (PDF) files saves significant production time. Plus, InDesign, Photoshop and Illustrator software share a standard Adobe interface, so you can get up to speed quickly and work more efficiently with tightly integrated tools.

- Upgrade \$359
- Academic \$215



Full		<b>\$1195</b>
Websearch WIN	210752	
Websearch MAC	210751	

## Adobe InDesign CS PageMaker Edition

Adobe InDesign CS PageMaker Edition combines the full version of InDesign CS with the Adobe PageMaker Plug-in Pack to provide an exclusive upgrade path from PageMaker. Popular PageMaker tools ease the transition to InDesign. Professionally designed templates introduce you to the advanced layout capabilities of InDesign. And extensive training materials help you master InDesign quickly. What ever you use PageMaker for now, you can build on your experience to hit the ground running with InDesign.


**\$675**

## Adobe GoLive CS

Adobe GoLive CS delivers what you need to create professional Web sites. Work with Adobe Photoshop, Adobe Illustrator, and Adobe Portable Document Format (PDF) files directly within GoLive without switching between applications. Share Adobe InDesign files for true cross-media publishing across multiple devices. Maximize your productivity with a creative Web design environment that suits your style. Design without compromise using powerful tools that support industry standards, including world standards for mobile and handheld devices.

- Upgrade \$359
- Academic \$119



Full		<b>\$625</b>
Websearch WIN	210755	
Websearch MAC	210756	



**Adobe Acrobat 6.0 Standard**

Streamline business document exchange and review. Enables business professionals to easily convert any electronic or paper document - even a Web site - to a reliable Adobe Portable Document Format (PDF) file for exchange and review with colleagues and customers.

Create and exchange electronic documents

Easy Adobe PDF creation, document merge, scanning to Adobe PDF.

Streamline document reviews

Review management, accurate comments, consistent summaries.

Protect sensitive documents

Password protection, 128-bit encryption, digital signature support.

• Upgrade \$199

• Academic \$135



Full	
Websearch WIN	196180
Websearch MAC	196173
	<b>\$455</b>

**Adobe Acrobat 6.0 Professional**

Advanced control over document exchange and output. Enables business, creative and engineering professionals who work with graphically complex documents to improve the reliability and efficiency of business-critical document exchange. Acrobat Professional offers all the benefits and features of Acrobat Standard and more.

Benefits for business professionals

Create and combine documents for review, streamline review management, use robust commenting tools, efficiently integrate comments, create forms, create secure, searchable archives

Benefits for engineering professionals

Create rich, layered documents, benefit from enhanced file viewing and navigation, comment using specialised tools

Benefits for creative professionals

Preflight and preview content, create rich-media Adobe PDF files, create forms, produce high-quality output

• Upgrade \$299

• Academic \$199



Full	
Websearch WIN	196182
Websearch MAC	196181
	<b>\$689</b>

**Centennial Media Illustrator CS**

Master this versatile graphic design program with this set of training CDs. Centennial Media will take you step by step through the powerful tools and special features of Adobe Illustrator CS with easy to follow teaching techniques.



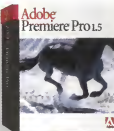
	<b>\$297</b>
Websearch Code	213183

**Adobe Premiere Pro 1.5**

Adobe Premiere Pro is a revolutionary nonlinear video editing application. Real-time video and audio editing tools give you precise control over virtually every aspect of your production. From advanced color correction to 5.1 surround sound mixing, you have the tools you need at your fingertips. Plus, flexible import and export options reduce format constraints. Built for the superior performance of Microsoft Windows XP systems, Adobe Premiere Pro takes video production to an entirely new level.

• Upgrade \$349

• Academic \$315



Full	
Websearch WIN	226108
	<b>\$1189</b>

**Adobe Video Collection Pro 2.5**

The Adobe Video Collection Professional delivers powerful, integrated tools for Windows based video production. Prepare layered images for video with Adobe Photoshop. Transform video into compelling stories with Adobe Premiere Pro. Create visual effects for the most demanding production environments with Adobe After Effects Professional. Author interactive, multi-language DVDs with all-new Adobe Encore DVD. Enhance all of your productions with multitrack audio accompaniments created using the professional tools in Adobe Audition. The Adobe Video Collection pairs creative control with the ability to deliver professional results for film, video, DVD or the Web.

Includes:

- Adobe Premiere Pro
- Adobe Photoshop CS
- Adobe After Effects
- Adobe Encore DVD
- Adobe Audition

• Academic \$919



Full	
Websearch WIN	224396
	<b>\$2559</b>

**Centennial Media InDesign CS**

Delivering tight integration with other Adobe graphics applications with easy-to-use tools that reduce elaborate design tasks to a few quick steps, and built-in support for publishing pages anywhere. Ideal for classroom training and lesson content.



	<b>\$199</b>
Websearch Code	213184

**Adobe Photoshop Album 2.0**

Finding and organising your digital photos is a snap with Photoshop Album. Now you can see all of your pictures in one convenient place. Instantly sort them by date or use keywords to organise photos by people, places, events or any other subject you choose. Easily import your photos from your digital camera with one click. Quickly fix common photo problems with the Single Click Fix button, eliminate red eye or crop out unwanted areas of your photos.

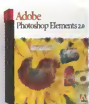


	<b>\$77</b>
Websearch Code	21248

**Adobe Photoshop Elements 2.0**

The perfect combination of power and simplicity so you can do more with your photos. From quickly correcting red eye, color and exposure to more creative editing, you can easily achieve outstanding results. Comprehensive Help features offer easy-to-understand explanations, definitions of terminology, hints for using editing tools and more. Inspirational Recipes describe how to apply amazing special effects and help you perform a variety of editing techniques.

• Academic \$77



	<b>\$139</b>
Websearch Code	191428

**Adobe Photoshop Album & Photoshop Elements 2.0 Bundle**

Adobe Photoshop Elements 2.0 plus Photoshop Album 2.0 combines two powerful products in one affordable package to give you everything you need to make the most of your digital camera. Now you can edit and creatively enhance your photos, share them countless ways with family and friends and always be able to instantly find any picture in your collection.



	<b>\$167</b>
Websearch Code	723042

**Centennial Media Photoshop CS**

The graphics industry worldwide relies on the power of Photoshop. Students will be well prepared for future employment if they have a sound understanding of this software.



	<b>\$363</b>
Websearch Code	213181





## ACDSee Photo Master Suite

ACDSee Photo Master Suite combines Corel PHOTO-PAINT 11 photo editing software, with ACD FotoMate 2.0 printing software and ACD mPower Toolkit multimedia software. Fix photos fast and create amazing graphics for print and web. Print professional-quality photos in three files easily. Organise and find them easily.



Includes full version of Corel PhotoPaint 11

**\$169**

Websearch Code 209558

## ACDSee Deluxe 6

ACDSee digital photo software makes it easy to import, view, organise, print, enhance, share and archive your digital photos. ACDSee is easy to use for everyone from beginner to professional level and also powerful and flexible enough to meet your needs as your image collection grows.



**\$88**

Websearch Code 211069

## ACDSee PowerPack Deluxe 6

Includes:  
ACDSee 6.0 Deluxe - Your Digital Photo Software and Picture Viewer  
ACD FotoCanvas - Your Easy and Affordable Photo Editor  
ACD FotoMate - Your Fast and Creative Photo Printing Software



**\$134**

Websearch Code 211505

## Roxio Easy Media Creator 7

Roxio Easy Media Creator 7 empowers you to live your digital lifestyle to its fullest potential. Go beyond just CD burning and now organise, edit, preserve and share your digital photos, music, video and data - all within one integrated product that seamlessly combines the complete versions of the latest, award-winning Easy CD & DVD Creator, PhotoSuite, VideoWave, and Napster brands.



**\$135**

Websearch Code 223844

## Roxio Photosuite 7 Platinum

Professional photo editing made easy. Instantly correct common photo problems and transform ordinary photos into personal masterpieces. Create stunning projects like calendars or holiday cards with point-and-click ease. Preserve a lifetime of precious memories on CD and share them in the comfort of your living room. The new Photosuite 7 Platinum Simply Picture Perfect.



**\$88**

Websearch Code 223845

## Sony Vegas5 & Vegas+DVD

With powerful video and audio production tools, Vegas software provides a complete and integrated solution for digital video, audio recording, editing and mixing, streaming content creation and surround sound production.

- Vegas+DVD Full (225149) \$1149
- Vegas 5 upgrade (246568) \$255
- Vegas+DVD upgrade (224184) \$396



**\$708**

Websearch Code 223776

## Sony Screenblast Movie Studio

Screenblast Movie Studio software is a powerful, yet affordable entry-level video editor that provides everything you need to turn your video into memorable movies in minutes. Also includes interactive tutorials.



**\$199**

Websearch Code 223917

## Roxio Toast 6 Titanium

Toast 6 Titanium, the newest and fastest version of Roxio's award winning CD/DVD burning software, is the foundation of your digital life. Toast helps you do even more with iTunes, iPhoto, and iMovie. Now it is easier than ever to make the most of your data, music, photos and video. Don't Burn It. Toast It.



**\$128**

Websearch Code 210126

## Roxio VideoWave 7 Professional

Roxio VideoWave 7 Professional makes it easy to edit and produce Hollywood-style videos complete with music, transitions, special effects, text credits and theatre-rich Dolby Digital sound. Author and burn professional-quality DVDs with animated menus and resizable buttons. VideoWave 7 Professional - the only video editing software you will ever need.

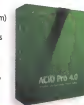


**\$110**

Websearch Code 223846

## Sony ACID Pro 4.0

Award-winning loop-based music creation tool that allows professionals to produce original, royalty-free music. Use ACID Pro software to create your own songs, remix those tracks, produce 5.1 surround audio mixes, develop music beds, score your own videos and create music for web sites and Flash(tm) animations. Work with a huge assortment of loops in multiple genres. ACID Pro software lets users compose using unlimited tracks of audio and MIDI, import and Beatmap complete songs.



**\$574**

Websearch Code 223016

## Sony Screenblast ACID 4.0

Screenblast ACID 4.0 is a loop-based music creation tool that is powerful enough for advanced users, yet easy to learn for the aspiring beginner. Make your own music or remixes, add soundtracks to videos and more. Also includes interactive tutorials.



**\$199**

Websearch Code 210896

## Roxio Toast with Jam

Delivers the full CD and DVD burning power of Toast plus pro audio CD editing and mastering for Mac. Record your world to CD or DVD - your audio, video, photos and data. Produce commercial CDs and demos with impeccable quality. Import your favorite file formats like AIFF, WAV, MP3 or SoundDesigner II. Plus much more.  
Built for Mac OS X.



**\$285**

Websearch Code 190313

## Nero 6

All of your CD and DVD burning tasks can be managed in a breeze with Nero 6. Burning DVD video, photo, data, audio or backup Nero handles all the possibilities with ease. Included within the burning solution, you can edit audio, mix multiple audio tracks like recording studio professionals, watch VCD, SVCD and DVD movies, listen to music, design covers, optimise your drive's performance and more.



**\$159**

Websearch Code 208952

## Sony Sound Forge 7.0

Sound Forge software is an award-winning digital audio editor that includes a powerful set of audio processes tools, and effects for recording and manipulating audio. This industry-standard application is the professional's choice for audio editing, audio recording, effects processing, streaming content creation, and more.



**\$619**

Websearch Code 211723

## Sony Screenblast Sound Forge

Record, edit, and process audio using easy drag-and-drop operations. It includes many of the same award-winning features found in Sound Forge 7.0 software, our professional digital audio editor. This streamlined version makes it easy to record, edit, and process audio using your PC.



**\$199**

Websearch Code 223014

## Pinnacle Instant Copy 8

Make copies of your DVDs and CDs faster and easier than ever. Featuring a friendly interface and revolutionary duplication technology, Pinnacle Instant Copy burns bit-for-bit CD and DVD copies at unbeatable speeds! It's the smart way to make true 1:1 copies of DVD movies, transfer DVD content to Video CDs, and backup any CD media, including eMCA, music, and video discs.



**\$88**

Websearch Code 210229

## Pinnacle Instant CD/DVD

With drag and drop simplicity, Pinnacle Systems InstantCD/DVD software accomplishes all the tasks associated with a disc burning project. It encodes MP3 files, burns audio CDs, duplicates CDs and DVDs, backs up data, and even creates photo and video slideshows that can be viewed on practically any home DVD player.



**\$139**

Websearch Code 210230

## Pinnacle Instant Video Album

Preserve and share all of your taped home videos onto DVD with Pinnacle Instant VideoAlbum. Instant VideoAlbum is designed to provide the highest quality results with the lowest possible learning curve. The software includes tools for trimming unwanted video and improving poorly lit shots.



**\$88**

Websearch Code 211290

## Pinnacle Instant Photo Album

Quickly organise your digital photos and video clips into interactive, high-resolution slideshows, burn them onto CD or DVD and watch them on your TV with PhotoAlbum. Instant PhotoAlbum quickly turns your photos into exciting productions that you can share and enjoy with friends and family for years to come.



**\$63**

Websearch Code 211291

## Steinberg Clean 5

Clean up those dirty, poorly compressed recordings with Steinberg CLEAN, the all-in-one audio restoration and CD burning solution. Developed by Steinberg, CLEAN breathes new life into your vintage vinyl, old cassettes and questionable MP3 files.



**\$85**

Websearch Code 211392

## Steinberg Clean Plus 5

Steinberg Clean Plus uses today's leading-edge audio restoration technologies to remove unwanted pops, clicks and hum from your old vinyl LPs and cassettes, leaving your tracks sounding as good as the day you bought them.

It's the perfect tool for archiving and preserving your entire music library.



**\$215**

Websearch Code 211391

Includes  
PRE-AMP

## Steinberg Cubasis VST 5

Create original compositions like the pros quickly and easily with STEINBERG CUBASIS VST version 5. The software features up to 48 audio channels, 64 MIDI tracks, a professional mixer with real-time effects and a huge variety of virtual instruments. Compose songs, edit sounds, print your scores and burn CDs with surround sound.



**\$215**

Websearch Code 214687

## Ulead PhotoImpact XL

PhotoImpact XL gives you the most innovative image editing tools for the PC. Edit, manage and share digital photos, plus so much more. More digital photography tools, more filters and effects, more content and more learning resources. It's everything you need to produce professional results fast.

• Upgrade  
(210124) **\$105**



**\$20 Cashback Offer\***

**\$168**

Websearch Code 210123

## Ulead DVD Movie Factory 3

Ulead DVD MovieFactory 3 Disc Creator is a whole new world of CD and DVD making. Burn movies, slideshows, data and music to CD or DVD in an instant.

• Upgrade  
(214048) **\$149**  
• Academic  
(214050) **\$149**



**\$20 Cashback Offer\***

**\$179**

Websearch Code 214048

## Ulead My Scrapbook 2

Everything you need to create scrapbook pages, background paper, clip art and titles on your computer. Customise and print a variety of scrapbook-themed pages and background paper to 8.5"x11" or 12"x12" format. Improve not-so-great photos with commonly used photo-editing tools. It's your complete scrapbooking software.



**\$10 Cashback Offer\***

**\$46**

Websearch Code 246573

## Ulead DVD Picture Show 2

The ideal companion for your digital camera, combining two powerful programs for managing your photos and creating exciting multimedia slideshows that play on your DVD player. Includes new PhotoExplorer 8.

• Upgrade  
(197228) **\$77**



**\$10 Cashback Offer\***

**\$88**

Websearch Code 110504

## Ulead Video Studio 8

If you've never edited a movie before, make it in three easy steps using the new Movie Wizard mode. Share finished projects on DVD, tape, the Web, and mobile devices. Unmatched stability, high-speed rendering and real-time performance mean less waiting and more time for creating.



• Upgrade  
(224056) **\$99**  
• Academic  
(224057) **\$115**

**\$20 Cashback Offer\***

**\$180**

Websearch Code 224055

## Jasc PaintShop Photo Album 4

Now you can quickly and easily make the most of your digital photos. Get your photos from camera to computer in just two clicks. Then enhance, organise, and share those digital memories in a flash with PhotoAlbum's fast and easy-to-use tools.



**\$85**

Websearch Code 196188

## Jasc PaintShop Pro 8

Not only have your favourite photo editing and graphic design tools been improved, there's a whole array of new ones. Plus, there's a brand-new integrated learning system that's easier to use than ever before.

• Upgrade (196525) **\$125**  
• Academic (196526) **\$165**



**\$215**

Websearch Code 196509

## Jasc Paint Shop Power Suite

Includes Paint Shop Pro 8 Complete photo and graphics editor; Paint Shop Photo Album Enhancement, Paint Shop Xtras Edition 1 and 2 - Ready-to-use artistic resources; Animation Shop - GIF animation; the web's full free learning tools.



**\$239**

Websearch Code 212742



## GoBack 3

GoBack 3 is a leading and comprehensive rollback utility. Once installed, it works transparently and continuously, tracking every move a PC user makes that affects the hard disk. This continuous tracking provides up-to-the-minute protection of the operating system, applications and data files and allows you to recreate the content of your hard disk as it was at virtually any moment in recent history – five minutes, five hours, even five days ago.

• Academic (246485) \$43



**\$65**

Websearch: 222061

## Symantec pcAnywhere 11.0

Combines secure, industry-leading remote control with remote management and advanced file transfer to help IT personnel quickly resolve helpdesk and server support problems. Offers comprehensive security, including support for 13 authentication types. Advanced security with 13 different authentication methods including RSA SecurID protects against unauthorised access to enterprise resources.

• 5 User (197440) \$525  
• Host Only (197447) \$159  
• Academic (197449) \$165



**\$245**

Host & Remote  
Websearch: 197446

## WinFax Pro

WinFax PRO 10 is the leading fax management software for small businesses. Its high-quality faxes help you project a professional image to your clients and customers. When image clarity is vital, you can generate photo-quality faxes. You can even send or forward faxes via email to people who don't have fax hardware or software.



**\$116**

Websearch: 189352

# Disk Management, Backup & Remote Productivity

Which is right for you?  
Use this handy table to  
compare our disk  
management  
solutions.



Key Features	Drive Image 7.0 Backup	Norton Partition Magic 8.0	Norton Ghost 2003
Schedule unattended backups	✓	✓	
Backup your operating system	✓	✓	✓
Save to CD	✓		✓
Check disk integrity	✓	✓	✓
Windows interface makes it easy to backup and restore data			✓
Safely run multiple operating systems		✓	
Separate and protect your data		✓	
Enhance operating system performance		✓	
Ability to store images on mapped network drives			✓
Writes images directly to hard drives and removable media	✓		✓
Writes images directly to supported USB and FireWire (IEEE 1394) devices	✓		✓
Fast PC-to-PC communication using a home network IP, USB, or high-speed parallel connection			✓
LiveUpdate makes it easy to keep Norton Ghost updated right over the Internet			✓
Backup everything without leaving Windows	✓		✓
Creates drive letters for your backups	✓		✓
Save to DVD	✓		✓
Create exact hard drive duplicates (with SmartSector Technology)	✓		

## Drive Image 7

Drive Image 7.0 Backup is a premier computer backup solution, protecting all your valuable data and providing peace of mind. Easily backup everything on your computer: priceless digital photos, important financial records, your operating system and all of your important programs and settings without ever leaving Windows. Save valuable time by scheduling automatic backups.

## Norton Partition Magic 8

Symantec's Norton Partition Magic 8.0 lets you easily organise your hard drive by creating, re sizing, copying, and merging disk partitions. Separate your operating system, applications, documents, music, photos, games, and backup files to reduce the risk of data loss if your system crashes. You can use Norton Partition Magic 8.0 to run multiple operating systems safely.

• Academic (226040) \$66

## Symantec Ghost 2003

Norton Ghost 2003 protects your data from computer disasters. The intuitive Windows interface makes it easy to create regular backups of your hard drive. You do not even need to make a boot disk. File restoration is simple from the comprehensive disk image. For small businesses, 5 and 10-user packs are also available.

• 5 User (192311) \$379  
• Academic (192622) \$79

Backup  
Solution

**\$88**

Websearch: 246378

Organise  
your  
hard drive

**\$88**

Websearch: 226037

Protects  
your  
data

**\$125**

Websearch: 191942





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\*PC or MAC compatible.

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